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ABSTRACT

This kit contains 16 comprehensive activity modules that elementary and seccndary teachers can use to introduce students to a wide range of population trends. The modules may also be used to introduce these trends to citizens in the community. Each module includes: (1) recommended educational level; (2) curriculum area (science, social studies, mathematics, language arts, social studies, economics, geography); (3) concept(s) fostered; (4) introductory comments; (5) instructional strategies for activities; (6) follow-up activities; and (7) references to other modules. Concepts or topics addressed include: population density; mathematical operations related to population dynamics; developing communication skills on community population issues; total fertility rate and average family size; population distribution; resource allocation; age structure; birth and death rate; planning and population policy; carrying capacity; interrelationships among global population, resources, and environment; values clarification; and zero population growth. Also included is a fact sheet and two copies of the Population Education Newsletter, Interchange. (JN)

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EDVENTURES IN POPULATION EDUCATION

TEACHER'S GUIDE

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ABOUT THIS KIT
What's in It . . . How to Use It

EdVentures in Population Education is an introductory sampling of activities and approaches you can use to introduce students in the classroom or citizens in the community to a wide range of basic and important population concepts, facts and issues.

The heart of the kit is sixteen activities that are designed to be enjoyable and easy to use as well as "value-fair." The activities cover 11 basic concepts, touch on at least six major curriculum areas and address a variety of learning levels from elementary to secondary.

Before selecting and using activities you may wish to test the knowledge of your target group by sharing a short pre-test ("Pop Quiz") with them. Of course you can administer it again as a follow-up after actually conducting some of the activities. The test is oriented toward general knowledge of population. Answers to the test questions are also provided.

Another major component of the kit is a carefully selected collection of background information and activity support materials. The materials are only a tiny fraction of the vast amount and array of materials on population topics available today. The collection contains charts, posters, pamphlets, newsletters and fact sheets that will help build a population information base.

An evaluation form also is included. Completing and returning it to us after using the kit will help in our ongoing effort to serve you as completely and responsibly as possible. Your feedback is important to us, so we urge you to take a few moments to give us your ideas and impressions.

You can use this kit in several ways. Among them:

- Use these activities as part of an independent or isolated unit on population or related contemporary social issues.
- Integrate activities into ongoing studies in curriculum areas indicated for each of the activities.
- Develop your own activities, or adaptations thereof, based on the activities and support materials found in the kit.
- Consider the purchase of several kits if you are a member of a community education action group. You can donate them to school classrooms or media centers. You may also sponsor a workshop to help train educators, policy makers or community leaders. These workshops help distribute the kits and magnify the population education effort.

A WORD ABOUT WORKSHOPS

ZPG recognizes that the production and dissemination of educational materials is only one part of the overall population education process. The other important part is training. This combination provides the formula for a successful approach to population education and for developing an understanding of how people relate to their environment.

One of the best forums for the exploration of population and environmental concepts is ZPG's "value-fair" teacher training workshops. ZPG sponsors ten to twenty workshops annually. Many are held at major teaching conventions such as the National Science Teachers Association. Others take place at the invitation of public and private schools nationwide and for special programs, such as global education events and National Wildlife Federation Conservation Summits. Ranging in length from one hour to several days, ZPG trains elementary and secondary teachers in the theory of population dynamics, including world and national trends in fertility, mortality, migration, age structure and geographic distribution.

Depending upon the audience, we can introduce groups to the use of the unique and enjoyable activities in our *Elementary Population Activities Kit,* or, for secondary school groups, our exciting and timely *Global 2000 Countdown Kit.*

We invite your inquiry about arrangements for a workshop in your area on the topics of your choice.

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SUMMARY OF ACTIVITIES

ACTIVITY TITLE	GRADE	CURRICULUM AREA(S)	POPULATION CONCEPT(S)
Are You Dense?	Elementary	Social Studies, Science	Population density
The Calculating Student	Intermediate to Secondary	Math	Mathematical operations related to population dynamics
Double Trouble	Upper Elementary to Intermediate	Math	Doubling time
Extra! Extra! Read and Write All About It	Intermediate to Secondary	Language Arts	Developing communication skills on community population issues
Family Tree	Elementary to Secondary	Social Studies, Math	Total fertility rate, average family size
Food for Thought	Intermediate to Secondary	Math, Economics, Geography	Population distribution, density, resource allocation
Hi-Lo	Upper Elementary to Intermediate	Math, Social Studies, Language Arts, Geography	Population density
How to Spend $5 Million	Intermediate to Secondary	Math, Social Studies	Resource allocation
Mystery of the Pyramids	Upper Elementary	Social Studies, Math, Geography	Age structure, birth rate, death rate
Pop Policy	Secondary	Social Studies, Political Science	Planning and population policy
Pop Quiz	Intermediate to Secondary	All	Developing/assessing a population-related knowledge base
Poppo!	Secondary	Social Studies	Developing a population-related knowledge base
The Stork and the Grim Reaper	Upper Elementary to Intermediate	Social Studies, Natural Science	Carrying capacity, birth rate, death rate
There's a Connection!	Intermediate to Secondary	All	Interrelationships among global population, resources and environment
Yours, Mine or Ours?	Intermediate to Secondary	Social Studies, Political Science	Values clarification and resource allocation
ZPG Island	Upper Elementary	Math, Social Studies, Language Arts	Zero population growth

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GLOSSARY OF TERMS*

AGE-SEX STRUCTURE. The composition of a population as determined by the number or proportion of males and females in each age category. The age-sex structure of a population is the cumulative result of past trends in fertility, mortality and migration.

BIRTH RATE (or CRUDE BIRTH RATE). The number of births per 1,000 population in a given year.

CARRYING CAPACITY. The maximum sustainable size of a resident population in a given ecosystem.

DEATH RATE (or CRUDE DEATH RATE). The number of deaths per 1,000 population in a given year.

DOUBLING TIME. The number of years required for a population of an area to double its present size, given the current rate of population growth.

EMIGRATION. The process of leaving one country to take up residence in another.

EXPONENTIAL GROWTH. A constant rate of growth applied to a continuously growing base over a period of time (e.g., a savings account increasing at compound interest, a snowball gathering mass or a population growing at 3.0 percent annually).

EXTINCTION. The condition that exists when a species has died out and is no longer in existence.

FERTILITY. The actual reproductive performance of an individual, a couple, group or population.

IMMIGRATION. The process of entering one country from another to take up permanent residence.

INFANT MORTALITY RATE. The number of infant deaths (infants under one year of age) in a given year per 1,000 live births in that year.

MIGRATION. The movement of people across a specified boundary for the purpose of establishing a new permanent residence. Divided into international migration (migration between countries) and internal migration (migration within a country).

NATURAL INCREASE. The surplus (or deficit) of births over deaths in a population in a given time period.

POPULATION. A group of objects or organisms of the same kind.

POPULATION DENSITY. Population per unit of land area (e.g., persons per square mile or persons per square kilometer of arable land).

POPULATION DISTRIBUTION. The patterns of settlement and dispersal of a population.

POPULATION EXPLOSION. Expression used to describe the 20th century worldwide trend of enormous and rapid population growth resulting from a world birth rate much higher than the world death rate.

POPULATION GROWTH RATE. The rate at which a population is increasing (or decreasing) in a given year due to natural increase and net migration, expressed as a percentage of the base population.

POPULATION INCREASE. The total population increase resulting from the interaction of births, deaths and migration in a population in a given period of time.

POPULATION MOMENTUM. The tendency for population growth to continue beyond the time that replacement level fertility had been achieved because of a relatively high concentration of people in the childbearing years.

POPULATION OPTIMUM. The ideal number of people that can be sustained in a given area, in contrast to overpopulation and underpopulation.

POPULATION PROJECTIONS. Computation of future changes in population numbers, given certain assumptions about future trends in the rates of fertility, mortality and migration.

POPULATION PYRAMID. A special type of bar chart that shows the distribution of a population by age and sex.

STABLE POPULATION. A population with an unchanging rate of growth and an unchanging age composition, because of age-specific birth and death rates having remained constant over a sufficiently long period of time.

STATIONARY POPULATION. A stable population with both a zero growth rate (because birth rate equals death rate) and an unchanging age composition.

TOTAL FERTILITY RATE. The average number of children that would be born alive to a woman (or group of women) during her lifetime if she were to pass through her childbearing years conforming to the age-specific fertility rates of a given year.

URBAN AREA. In the U.S., "incorporated and unincorporated places of 2,500 or more inhabitants, plus the urbanized zones around cities of 50,000 or more inhabitants," according to the Bureau of the Census.

URBANIZATION. Growth in the proportion of a population living in urban areas.

ZERO POPULATION GROWTH. A population in equilibrium, with a growth rate of zero, achieved when births plus immigration equal deaths plus emigration.

*From *Population Handbook*, Population Reference Bureau, 2213 M Street, N.W., Washington, D.C. 20037.

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ARE YOU DENSE?*

GRADE: Elementary
CURRICULUM AREA: Social Studies, Science
CONCEPT: Population density

INTRODUCTION

Population density refers to the number of living things within a given area. For example the density of the human population would be expressed as the number of people per square mile. Population density is of particular importance where crowding occurs and in situations where high density affects human behavior. Of course, in very sparsely populated areas other effects occur. This activity will examine the concept of density and how individuals react in variously dense settings.

After completing the activity, students will be able to state how they feel about the relative "comfort levels" they might prefer and predict three consequences of crowding.

ACTIVITY

Materials: Pencils; paper; measuring tape; yardstick or meter stick; masking tape (optional).

Preparation: Move all student desks to the perimeter of the classroom, leaving as large an open area as possible. Use strips of masking tape on the floor to divide the open space into fourths.

Procedure: Direct the students to occupy the open space for a short time (perhaps 30 seconds to one minute). They should be free to circulate and talk quietly with their friends. After the short time, ask students how they are getting along in the space in the middle of the classroom.

Next, ask them to occupy a space only half as large (as designated by the taped off area) and repeat the process. Repeat a third time, with all students contained in one-fourth the original space. Ask them to share their feelings about "life" in the smaller space.

FOLLOW UP

Ask your students to vote for the space they liked most and least. Ask them to give reasons for the preferences.

Ask students to think of situations in which lots of people in a small space might be a good idea. List the responses. Then ask them to think of situations when having very few people in a given area might not be a good idea. List those responses and compare with the first list.

You may also ask the students to calculate the population densities experienced during each phase of the activity. First, they can determine the area of each taped off space. This should be expressed in square feet, yards or meters. Divide the number of students by the area to give the number of students per unit of area.

Example:

$$\frac{\text{Number of students}}{\text{Area (in square units of measure)}} = \text{Density}$$

$$\frac{25 \text{ students}}{25 \text{ square meters}} = 1 \text{ student per square meter}$$

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit:*

- "Crowding Can Be Seedy"
- "I Like Crowds When. . . ." from "Population Action Cards"

*From *Population Education Activities for the Classroom* by Judith Schultz and Herbert L. Coon

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THE CALCULATING STUDENT

GRADE: Intermediate to Secondary
CURRICULUM AREA: Math
CONCEPT: Mathematic operations related to population dynamics

INTRODUCTION

Understanding population dynamics requires that students master a few basic mathematical operations. The following activity is in three sections. The first section deals with such important mathematical operations as calculating percentages and using division to calculate distribution of goods and products. The second section deals with the calculation of growth rates. The last section deals with the concept of large numbers.

By completing the activities, students will be able to calculate percentages and growth rates and define a billion in terms that are personally meaningful.

ACTIVITY

Procedure: The three sections of the activity are presented as Activity Sheets. Students can work alone or in groups, or the problems can be worked on by the entire class. Answers are presented at the end of the activity.

FOLLOW UP

The daily newspaper can be the source of a variety of figures that can be used in population math exercises. Calculating growth rates for the students' own cities, number of telephones per person in New York and so on can make the activities more relevant.

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit:*

- "Adding Armadillos"
- "ZPG Island"
- "More Equals Less"

From the *Global 2000 Countdown Kit:*

- "The People Connection"
- "The Lion's Share"

ANSWERS

Activity Sheet I

1) $^1/_6$ 2) Yes, if you know that the population was slightly over 30 million in 1680 vs. 200 million in 1965. For this reason, absolute increase is much greater in 1965, although the percentage of increase is smaller; 1,080,000; 3,400,000 3) $0.99; $2.97 4) .6 tons or 1,200 lbs. 5) 10 people; 26,667 6) $5.00; $2.50.

Activity Sheet II

Country A: .8%
Country B: .2%
Country C: 2.2%

Activity Sheet III

1c) over 95 years; 2a) 1,000 days. 2¾ years; 2b) 1 million days. 2,739.7 years; 2c) 756 (rounding off) in 1984, 755 in 1985, etc.

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Activity Sheet 1

PERCENTAGES AND DISTRIBUTION

1. One-third of the Earth's surface is land.
People live on one-half of the land.
People live on what fraction of the Earth's surface?

2. People often confuse the size of the percentage with the absolute amount. In other words, 3 percent of something is not larger than 1 percent of something else if the base of the latter percentage is sufficiently greater. The following exercise is an example.

   The population of the U.S. grew by 3.6 percent in 1860. (Population = 30 million in 1860.)

   The population of the U.S. grew by 1.7 percent in 1965. (Population = 200 million in 1965.)

   Can you tell in which year more people were added to the population?

   How many people were added in 1860? In 1965?

3. Napoleon has saved $5.94. He is going to buy six presents—one each for his mother, father and four sisters. Each present costs the same. How much does he spend on each present?

   Do the same, only pretend that Napoleon has a mother, father and only one sister. If Napoleon still spent 99¢ on each present, how much would he have left over?

4. 140 million tons of pollutants are put into the atmosphere each year in the U.S. There are about 230 million people in the U.S. (1980 census). How many tons is this per person? How many pounds?

5. Population density is the number of people living in a unit area. If 100 people live in 10 square miles, how many live in one square mile (on the average)?

   New York City has a population of about eight million people who live on 300 square miles. What is the population density per square mile in New York?

6. Frank has $2,000 to spend on books for school children. If there are 400 children, how much can he spend for each child?

   If there are 800 children, how much can be spent for each child?

*From Kathy Shordt, *Modern Mathematics Exercises in Population Dynamics*. September 1972

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Activity Sheet II

GROWTH RATES

A. To calculate how much a country grows in a year, demographers subtract the number of deaths from the number of births (natural increase) and add net immigration (number of people legally entering a country minus the number leaving the country; estimates of illegal immigration are not included in this figure). Crude birth rates and death rates—the numbers of these events per 1,000 population—are also used to calculate the growth rate of a country.

To calculate the growth rate of the United States (using mid-1984 rounded figures):

1. Subtract the death rate from the birth rate to find the number of people per 1,000 population.

Birth rate of 16 per 1,000
− Death rate of 9 per 1,000
7 people added per 1,000 population

2. Find the number of groups of 1,000 in the U.S. population of 236 million.

236,000,000 ÷ 1,000 = 236,000 groups of 1,000

3. Then multiply the number of persons added per group by the number of groups.

7 x 236,000 = 1.7 million people added by natural increase

4. Adds net legal immigration to this figure.

1.7 million natural increase
+.5 million net legal immigration
2.2 million people added to U.S. population in 1984

5. To find the annual growth rate, divide the number of new people added that year by the population at the beginning of the year. Then multiply by 100 to express as a percent. (For example, if a country whose population was 100 added 10 new people in a given year, the original population has increased by 10 percent: 10/100 = .1 x 100 = 10 percent)

In the United States:

$\frac{2.2 \text{ million}}{236.0 \text{ million}} \times 100 = .9$ percent growth rate for 1984

B. Calculate the growth rates for each of the following fictional countries using the formulas from Part A and the statistics given below. Use the work space to calculate your answers.

1. *Country A*

Population: 25 million
Birth Rate: 16 per thousand
Death Rate: 9 per thousand
Net Legal Immigration: .02 million

Growth Rate: _____

2. *Country B*

Population: 62 million
Birth Rate: 12 per thousand
Death Rate: 10 per thousand
Net Legal Immigration: .01 million

Growth Rate: _____

3. *Country C*

Population: 730 million
Birth Rate: 36 per thousand
Death Rate: 15 per thousand
Net Legal Immigration: .4 million

Growth Rate: _____

Work Space:

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Activity Sheet III

WHAT IS A BILLION?

World population in the mid-1980's is 4.8 billion people. Is that a little or a lot? This exercise will help you appreciate how much one billion is. Because we are really talking about people and not dollars, it may help to consider the needs and hopes of human beings as well as the impact of 4.8 billion people on society and the environment.

1. Your rich uncle has just died and has left you $1 billion. If you accept the money you must count it for eight hours a day at the rate of $1 per second. When you are finished counting, the $1 billion is yours and then you may start to spend it.

   a. Do you accept your uncle's offer?

   b. Why or why not? _____

   _____

   c. How many years will it take to count the money?

   _____

2. a. If you spent $1 million at the rate of $1,000 per day, how long would it take you to spend it?

   Days:_____ Years:_____

   b. How long would it take to spend $1 billion at the same rate?

   Days:_____ Years: _____

   c. If you started spending the $1 billion in the year 1 A.D., at the rate of $1,000 per day how many more years would it take you to spend it?

   Years. _____

Work Space:

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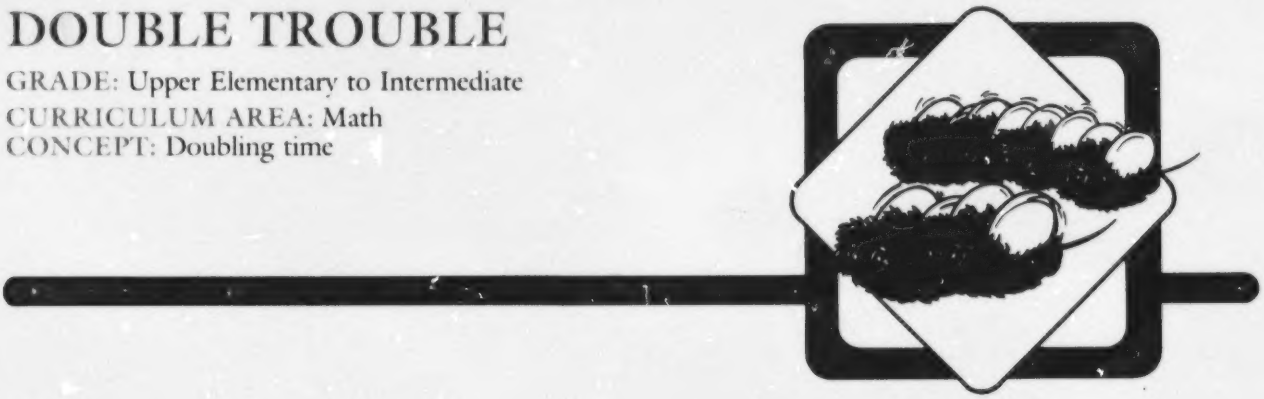
DOUBLE TROUBLE

GRADE: Upper Elementary to Intermediate
CURRICULUM AREA: Math
CONCEPT: Doubling time



INTRODUCTION

Perhaps no concepts in population education are more troubling yet more basic than exponential growth and doubling time. The concepts can be stated very simply, "the faster a population grows, the faster it grows," but making this abstract concept relevant to students is often a challenge. The following activity uses riddles and a discussion of historic population trends to explore these basic concepts.

By completing this activity, the students will be able to define "doubling time" and explain how they feel about the consequences of accelerating human population growth.

ACTIVITY

Procedure: Follow the steps as indicated.

A. ***Doubling Time:*** Have your students examine the following chart of human population on the Earth.

How Long Did It Take?

Year	*Population* (in billions)	*Number of Years to Reach* (to reach the first billion, the second, etc.)
1800	1	Approx. 3 million
1930	2	130
1960	3	30
1975	4	15
1987	5	12 (estimate)
2000	6	13 (estimate)

Pose the following questions and allow the class to explore possible answers:

1. Why did it take so long for the human species to reach the first billion in population?
2. What factors have been responsible for the acceleration of population growth after 1800 and, in particular, during the 20th century?
3. Will the human population stop growing at some point in the future? When? If yes, what will bring about this stabilization?
4. What do you think is the best size for the human population in terms of what you value? What is the difference between maximum and optimum population?

B. ***Doubling Riddles:*** While your students will probably hypothesize many reasons for the growth indicated in the preceeding population chart, the concept of doubling time itself may not specifically be voiced. The following two riddles can be used to introduce this concept and the questions in "A" can then be explained in light of this specific concept.

1. A father complained that his son's allowance of $5 per week was too much. The son replied, "Okay, Dad. How about this? You give me a penny for the first day of the month, 2¢ for the next, 4¢ for the next, 8¢ for the next, and so on for every day of the month." The father readily consented.

   Who was the more clever? (The son would receive $10,737,418.24 on day 31.)

   Give your students a page from a large calendar and allow them to try this activity using grains of rice or popcorn instead of the pennies.
2. Lily pads have started to grow in a 40-acre pond. The pads double in size each day and take 40 days to cover the entire pond. On which day do the pads cover exactly half of the pond? (They will cover half the pond on day 39.) Many students will say day 20, but this response indicates that the students are thinking of linear or arithmetic growth, not the accelerated speed of exponential or geometric growth.

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FOLLOW UP

For the mathematically inclined, the following calculation of exponential growth may prove interesting. The city of "Doublin" has a population of 1,000,000 and is growing at the rate of 10 percent a year. What will its population be in five years?

At the end of Year 1:
1,000,000 plus 10 % of 1,000,000 = 1,100,000

Year 2:
1,100,000 plus 10 % of 1,100,000 = 1,210,000

Year 3:
1,210,000 plus 10 % of 1,210,000 = 1,331,000

Year 4:
1,331,000 plus 10 % of 1,331,000 = 1,464,100

Year 5:
1,464,100 plus 10 % of 1,464,100 = 1,610,510

How long will it take for Doublin's population to double at a 10% growth rate? (Just over seven years)

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit:*
- "Adding Armadillos"
- "Doubling on the Line"

From the *Global 2000 Countdown Kit:*
- "The People Connection"

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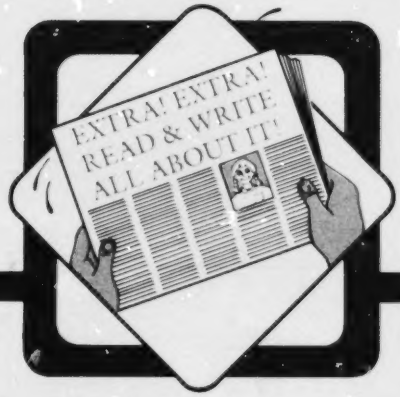
EXTRA! EXTRA! READ AND WRITE ALL ABOUT IT!

GRADE: Intermediate to Secondary
CURRICULUM AREA: Language Arts
CONCEPT: Developing communication skills on community population issues



INTRODUCTION

There are many ways to learn about a topic such as population. Often the mass media—radio, television, magazines and newspapers—can provide interesting examples to illustrate concepts. Communications skills on both the delivering and receiving ends are extremely important in developing an awareness and understanding of population-related issues. In this activity, students will gain insights into population topics and issues through a series of reading and writing exercises.

After completing the activity, students will be able to predict one possible impact of zoning on a community, state three effects of high population on community planning and be able to clearly communicate their feelings on a particular population issue.

ACTIVITY

Materials: Writing paper; several editions of the local newspaper; a supply of *Newsweek, Time* and *U.S. News and World Report* magazines; copies of the article on Fairfax County, Virginia (master provided).

Procedure: This activity is divided into three parts. Follow the steps for each part.

A. Have students read the article, "Fairfax: Facing the Facts of Growth," and answer the following questions:

1. What steps were taken by the Fairfax County Board of Supervisors in response to the county's rapid population growth from 1960 to 1970? How much had the county grown from 1960 to 1970?
2. What were to be the benefits of the PLUS program? Who participated in developing the program?
3. What people were not pleased with the PLUS requirement that development be restricted to those areas where facilities such as schools, fire stations and services such as water and sewer are available?
4. Why did the courts rule against the provisions of the PLUS program?
5. Following defeat of the PLUS program in the courts, why did the Fairfax County planners prefer high density development (townhouses and apartments) to "suburban sprawl" as a way to deal with future population growth? Why did the citizens prefer the sprawl?
6. What do you believe Fairfax County will be like in 25 years? Explain the reasons for your prediction.

B. Have your students research population trends in their own community using a local or state planning agency, school board, the Data Users Services Department of the U.S. Census Bureau (Washington, D.C. 20233) or newspapers as sources of information. After completing their research, your students should answer the following questions and complete the indicated tasks.

1. Write to the Planning Board of Petaluma, California (zip: 94952) for the story of a town that was granted the right to control its growth in a Supreme Court decision. How does this case differ from that of Fairfax County, Virginia?
2. Obtain a copy of your town's master plan, if it has one. Make your own map of the area as a plan for your community's future development or non-development; base your plan on existing development plus your ideas about what is best for the community. Describe your plan, including the environmental, economic and social factors that you took into consideration.

C. Have students fill out the activity sheet on page 3 of this form.

D. Have your students keep a scrapbook of newspaper and magazine clippings related to population growth or change. The students should perform the following steps and answer indicated questions:

1. Arrange articles for a scrapbook on local population issues according to categories such as energy shortages, traffic, growth or decline in population, changes in school-age population, unemployment. Label the categories.
2. Follow directions as above, but for world population issues.
3. Analyze your scrapbooks and describe how your community compares to the rest of the country

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or world in population trends and population-related problems. How does world population growth affect your community? How does your community's level of consumption affect others in the world?

NOTE: For general article critiques, tell students to keep the following criteria in mind (from *101 Ways To Use U.S. News and World Report in Your Classroom*):

- Does the headline accurately describe the event?
- Is the account based on fact or opinion?
- Are opinions clearly labeled as such?
- Are important facts detailed?
- Are several sides of a controversial issue adequately discussed?
- Are photographs, drawings or other illustrative or supplemental information impartial?

When the article describes controversial issues, have students list pro's and con's and, based on the information given, reach their own decision on the merits of the issue. Ask them to collect three additional sources of information on the same topic and ask themselves: "Has my decision changed as a result of the new information? What additional information was provided in the second set of sources? What information altered/confirmed my initial decision?"

FOLLOW UP

A. Ask students to write an editorial about at least one article that was particularly meaningful to them. Have them submit their editorial to the school newspaper. Then have them write a letter-to-the-editor of the publication in which their article was printed. Ask the students to draw a cartoon that summarizes or illustrates a major premise of the article.

B. Encourage students to make regular contributions to the school newspaper based on their observations and thoughts relating to current population issues. Have them include recommendations about what they and their peers could do to make a difference at the local level. For instance, if a small town in which they are living has recently been inundated with newcomers, and this has created problems for the town's residents, students might seek information on zoning laws and other civic means of protecting their community. (Articles based on the small town boom can be found in *Newsweek*, "A Boom In Small Towns," March 16, 1981; *U.S. News and World Report*, "Population Surge Shakes Up Small Towns," May 18, 1981; and *Newsweek*, "America's Small Town Boom," July 6, 1981).

C. Based on current trends, have students write scenarios of what they think life will be like in the year 2000. As a class, list on the chalkboard as many of the students' ideas as possible. Expect some conflicting predictions. Later, have students pretend they are now living in the year 2000 and many of their predictions have come true. Tell them to look back to this year and make recommendations that could have prevented some of the negative changes that have occurred. Discuss whether they could work toward carrying out any of these changes now.

D. Read *The Grapes of Wrath* by John Steinbeck. Write an essay describing the population concepts this novel contains (birth, death, migration). Include a brief comparison of the time of the novel with our time in terms of birth and death rates, as well as the weather conditions and food supplies or preferences.

CROSS REFERENCES

This activity relates or is similar to the following ZPG population education activities:

From the *Elementary Population Activities Kit:*

- "Pop News" from "Population Action Cards"

From the *Global 2000 Countdown Kit:*

- "Ode to a Fish"

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1. How did the population of your county, town or city change from 1960-1970?

2. From 1970-1975 (if data are available)?

3. Were changes primarily due to births and deaths or to migration into or out of your community?

4. What are the citizens' attitudes toward growth (or stabilization or decline) of population?

5. Are most citizens in agreement or are there opposing viewpoints?

6. What is the local government's program for regulating growth?

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Grace Dawson

Fairfax: Facing the Facts of Growth

"We've been reacting to, rather than controlling growth.... The people just won't take any more."
--Member of the Fairfax
County Board of Supervisors,
Washington Post, April 9, 1973.

"There is a reasonable amount of growth a jurisdiction can absorb, but I don't think we should be inundated."
—Member of the Fairfax
County Board of Supervisors,
Washington Post, Nov. 14, 1976.

If you had been shipwrecked on a desert island since 1973 and returned to find Fairfax County still locked in combat with the forces of growth, you might think that little had been done in your absence to slow development in that affluent suburb. But if you had been a Fairfax County resident since 1973, The Post's recent front-page article on growth in the county undoubtedly stirred feelings of both puzzlement and *deja vu*.

Didn't Fairfax County just complete a $1.5 million, 18-month program aimed at controlling growth? Wasn't a theme in the county's 1975 elections that the completion of its Planning and Land Use System (PLUS) assured that the county would develop in a rational pattern, in accordance with its ability to provide public facilities? Why, three years later, is development there at an all-time high, with the worst yet to come according to county analysts? Why is the amount of open space consumed per housing unit now three times the amount in 1971?

What happened?

What happened in Fairfax County is similar to what has happened in a number of other suburban areas. Local government decides to seize control of the development process. Private landowners and developers object. Courts intervene, emphasizing the limits to government regulation of private property. Realizing that they must accept their share of new development, local government chooses to continue the existing pattern of low-density development, rather than switch to more dense, less land-intensive configurations. Growth goes on much as it has in the past.

Every three or four years, local government discovers anew the negative effects of allowing sprawling development to blanket the land, and the cycle repeats. Do not pass go, do not collect $200. What has happened during the last three-year cycle in Fairfax County is illustrative of this process.

Fairfax County, long a bedroom community to the nation's capital, includes 400-square miles of rolling Virginia countryside and a population of half a million whose per capita income leads the nation. As of 1975, the average price of a new single-family home—the predominant dwelling type in the county—was $62,500. During the county's 1960-70 building boom the population nearly doubled—growing from 250,000 to 450,000. But despite such growth, there is still room for much more; at present, 53 per cent of the land in the county remains undeveloped.

In 1973, after several piecemeal attempts at slowing growth, the Fairfax County Board of Supervisors unanimously agreed to develop a comprehensive program for controlling growth and preserving the environment. Hailed as a sweeping, innovative program, the Planning and Land Use System (PLUS) had a number of major elements: the production of new comprehensive land use and transportation plans for the entire county; the adoption of a long-term capital improvement program, and the enactment of an ordinance that would restrict development to those areas where public facilities such as schools, fire houses, and water and sewer service were available.

The writer is a research associate at the Urban Institute's Land Use Center.

A staff of more than 30 planners, lawyers, environmentalists and engineers was hired to work with the existing county staff in designing the PLUS program and putting it into operation. In addition, the program included active participation by the county's articulate, well-educated citizenry.

The citizens supporting the PLUS program believed that through the new land use plans and the public facilities ordinance, the local government rather than private developers could determine what was built on each parcel of land and when it was built, if at all. With this kind of power, the existing residents of Fairfax County could safeguard their own property values by limiting the availability of competing housing, and could also preserve the suburban quality of life they cherished. This was all well and good, except for one thing: The local government had no such power.

Several groups of private developers and landowners turned to the courts. In a series of decisions, the local and state courts determined that it was unconstitutional for Fairfax County to regulate when development could or could not occur based upon the availability of facilities. Such regulation, the courts ruled, deprived landowners of the use of their land for a period of time without just compensation. And so the notion of a public facilities ordinance that would allow the county to time development was soon abandoned. All that remained in the PLUS program's growth control arsenal were land use and facility plans.

But here is where the story takes an interesting turn. Without the ability to use timing as a means of slowing development, the county would continue to accept its traditional share (about 24 per cent) of the region's population growth. With "to grow or not to grow" no longer the issue, the question facing Fairfax County became "what kind of growth?" Three single-family units per acre had been the style in the county during the past decade. The planners argued that higher-density development would afford a number of benefits: Less open space would be absorbed; the possibility for moderate use of mass transit would be enhanced; and lower-priced housing could be provided to attract a broader spectrum of income groups.

However, when confronted with the prospect of altering the existing lifestyle in this way, most citizens—who at the beginning of the cycle lamented the displacement of horse farms and rolling hills by sprawling development—opted for more of the same, more of what was already there, more sprawl.

This choice is not surprising given that Fairfax County, like many suburban areas, is populated by escapees from the more dense inner suburbs and urban areas. Despite complaints of long trips to work and traffic congestion, when suburban homeowners made a down payment on a quarter-acre manse, they bought considerably more than a patch of green and a split-foyer colonial. They bought protection from the infringement of garden apartments and, heaven forbid, bigarises; they bought middle-class school mates for their children; they bought neighboring taxpayers who could pay their own way. They were not about to threaten these values by encouraging "high" density townhouses and apartments.

And so the residents of Fairfax Couty are likely to see a great deal more sprawling development before the next generation of growth control advocates rises up and says, "The people of Fairfax County won't stand for any more growth...."

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FAMILY TREE

GRADE: Elementary to Secondary
CURRICULUM AREA: Social Studies, Math
CONCEPT: Total fertility rate and average family size

INTRODUCTION

Small differences can add up quickly where population growth is concerned. A population with a higher average family size produces larger numbers of people over time than a population with a smaller average family size. This activity and the accompanying illustration show concretely what a difference a two- versus three-child average family size can make over time.

After completing this activity, students will be able to calculate the number of offspring in the third generation given the average family size and predict three impacts a higher average family size has on world resources.

ACTIVITY

Materials: For the main activity, no materials are needed except the students themselves. (The Follow Up activity requires eight small plastic bags and 253 beans.)

Preparation: As the accompanying "tree" diagram shows, you will need 57 students to portray the parents and all descendents of a two- and a three-child family over three generations. (Death and the existence of spouses are not considered in this activity.) When there are not enough students available, chairs can be used for the first two generations or only two generations may be shown. Or, illustrate parents plus all descendents of a one- and a two-child family instead (needs 21 students).

Procedure: Use the following guide to conduct the activity.

A. Tell the students that the activity in which they are about to participate is designed to show the importance of average family size. Explain that a large average family size can result in a significant increase in population over time. Point out that many different arithmetic combinations can result in a particular average size. For example, some couples may have three or four children and other couples none, but the *average* may be two.

B. Move the students to a large open area and ask for four volunteers or designate couples "1" and "2".

C. Tell the students that the main difference between couples "1" and "2" is that couple "1" has a family tradition of having only two children per family while couple "2" has a family tradition of having three children.

D. Tell couple "1" that they each had only one sibling and want to continue that family tradition. Have them pick two of their fellow students as their "children." Ask the "children" to stand in front of their "parents".

E. Tell couple "2" that they have a family tradition of three children. Have them pick three students for "children." Ask these "children" to stand in front of their "parents."

F. Continue this process for two more generations. Have the children of couple "1" pick two more children and then have these children pick two more. Have the children of couple "2" pick three more and these children pick three more. The children of each generation should stand in front of their "parents," simulating a family tree.

G. At this point, couple "1" will have 14 children and grandchildren. Couple "2" will have 39. Ask the students what difference it would make if the childbearing decisions of the two families were multiplied by the decisions of millions of couples. While it doesn't matter much if one family has 10 children, if the average family has ten children, the impact on world population and resources is indeed enormous!

NOTE: It is important to be sensitive to the feelings of children from large families. This exercise illustrates the cumulative impact of individual decisions. For the students from large families, emphasize that the exercise applies only to the future, not the past.

FOLLOW UP

Another interesting way to illustrate the impact of a two-child family average compared to that of a three-child family if continued over a number of generations is to use kidney beans or grains of rice. Have the students prepare a series of small plastic bags containing beans to represent the number of children in succeeding generations of families. Have one group construct a series for a two-child family and one group do a three-child family. Variations can include extending the number of generations to see how quickly large numbers mount up or demonstrating what happens with families of larger average size.

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities.

From the *Elementary Population Activities Kit:*

- "More Equals Less"
- "Doubling on the Line"

From the *Global 2000 Countdown Kit:*

- "The People Connection"
- "The Lion's Share"

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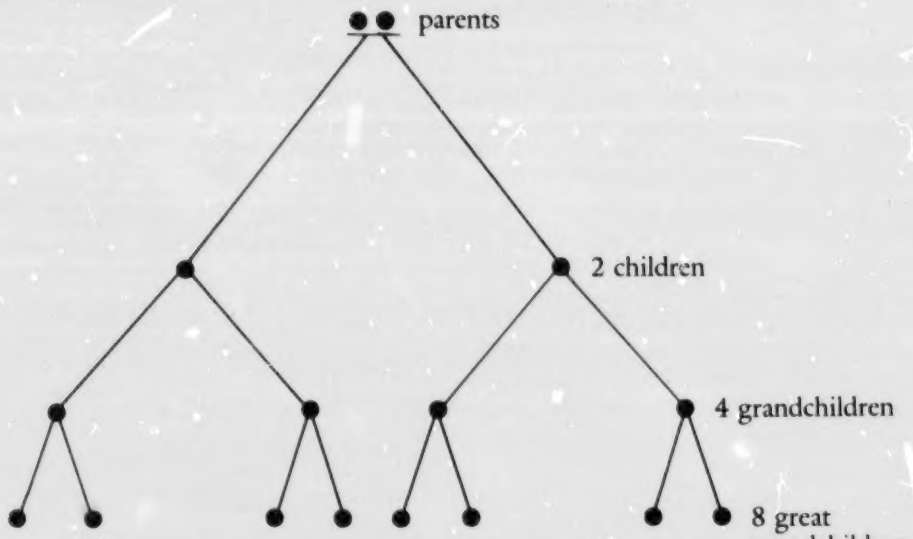
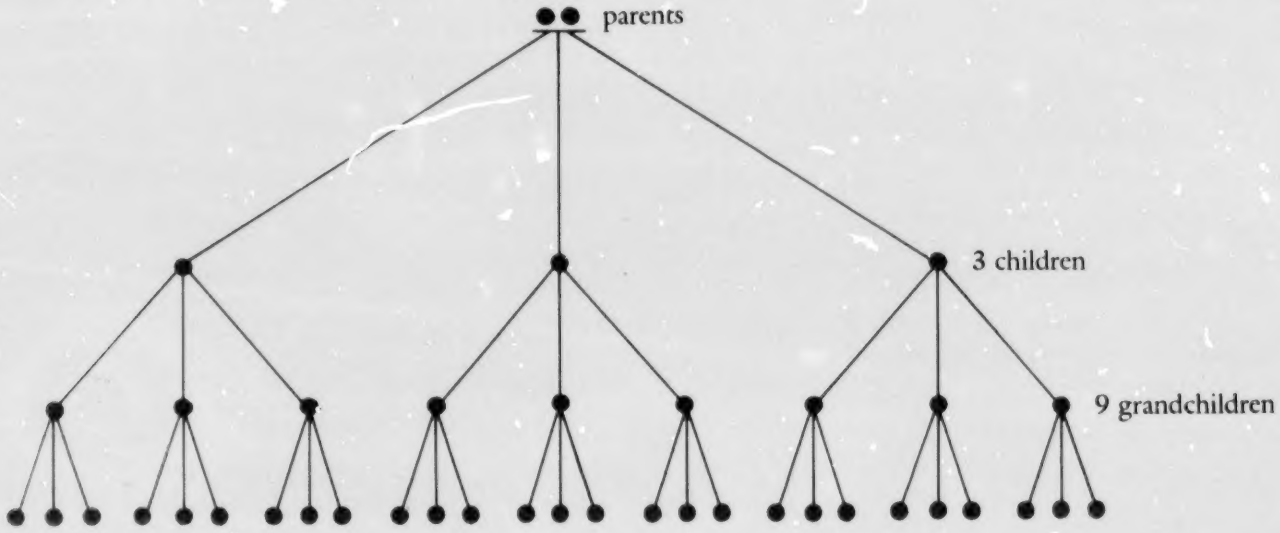
THE TWO- OR THREE-CHILD FAMILY

2 CHILD AVERAGE



Total: *14* direct descendants

3 CHILD AVERAGE



Total: 39 direct descendants

27 great grandchildren

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FOOD FOR THOUGHT*

GRADE: Intermediate to secondary
CURRICULUM AREA: Math, Economics, Geography
CONCEPT: Population distribution, density, and resource allocation

INTRODUCTION

All societies need and use food and natural resources, but not all societies use them in the same ways. The distribution of food and resources, consumption patterns and size of the human population compared to the size of a country may differ greatly around the world. This sets the stage for "have" and "have not" societies with the resulting possibilities of social unrest and human discomfort. This simulation helps to demonstrate the uneveness in the distribution of population and resources and the resulting social problems.

After completing this activity, students will be able to state at least two factors that might be used to determine the relative affluence of a country or continent and locate on a map two countries that are rich in a particular resource.

ACTIVITY

Materials: Assorted colors of yarn or colored chalk to make the outline of six "world regions" (see "Region Information" chart for size of each region); masking tape (to tape yarn to floor in each region's outline); ambassadors' cards (furnished); six large placards labeled with names of world regions (or small paper signs with pins); long loaf of French or Italian bread, unsliced; bread knife; toothpicks; six 3" x 5" index cards; the "World Population Data Sheet"; scissors. For Follow Up activities you will need Hershey's Chocolate Kisses and one pound of peanuts in the shell.

Preparation: Prepare to conduct the activity by following the steps indicated:

A. Arrange yarn for world regions in random shapes on the floor and tape down. (Choose an out-of-the-way space to avoid tripping over yarn.)

B. Mark the loaf of bread into twelve partially sliced sections. Identify each world region by writing on the section with a felt tip pen. (If you use this method be sure to advise participants not to eat that part.) You could also write the names of the world regions on 3" x 5" index cards and stick them on the sections of bread with toothpicks.

C. Count the number of participants. The following script is designed to use a total of 50 "citizens" to populate world regions. However, you can adapt the game for 25-30 participants. You can use chairs as "citizens" if you have too few students. "Extra" people can form a United Nations International Advisory Board. Ask these advisors to closely observe the game and, at the end of it, to recommend at least three policies to help deal with population/ food/income inequities among nations. The observers might consider, for example, whether or not these inequities *are* problems and might contemplate such questions as: 1) Should food aid be given to countries that have not yet effectively dealt with their population problems? 2) Do donor nations have the right to link food aid to certain policies? 3) Should rich countries reduce their consumption levels? How could this be encouraged or enforced? You might write these or similar questions on index cards to give to the advisory board.

Procedure: Read the following script or use it as a guide to assist students in arranging themselves in each "world region."

"I'd like to share with you an activity called 'Food For Thought' that will help you gain an appreciation for population distribution among world regions as well as urban/rural dwelling patterns, arable (or farmable) land and protein consumption.

"First, we need six volunteers to be ambassadors from these world regions." (If no one volunteers, quickly appoint them; give all ambassadors their ambassador's information card.)

"Would the ambassadors please choose some citizens to help populate their region? The ambassador from North America will need to pick three citizens. The ambassador from Latin America, four citizens; from the U.S.S.R., three citizens; from Africa, five citizens; from Europe, six citizens; and from Asia, 29 citizens.

Give sign (pin it on) or placard (labeled with name of world region) to ambassador.

"Ambassadors, would you please tell us something about your region by reading the card you have? First, let's hear from the North American ambassador." Then ask to hear from the Latin American, Soviet, African, European, and Asian ambassadors.

If time and interest allow, you can use overhead transparencies, slides or posters to compare and illustrate differences among regions on such variables as infant mortality rate, birth rate, growth rate, doubling time, life expectancy, etc. For example, students might make one poster to illustrate each variable.

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"Next, let's look at land areas and how they're used. How many people are there compared to the amount of land in each region? How many people live in cities? How much agricultural land is there per person?

"North America has 16 percent of the world's land area but has 6 percent of the world's population. In North America, 3/4 of the population lives in urban areas. So, North American ambassador, would you please have 3/4 of your people stand on the border of the region (which represents urban areas) away from the countryside. The remaining 1/4 can move into the middle (countryside) and be farmers. Unfortunately, not all of the land in the countryside is arable, or capable of being farmed. So farmers, you're going to have to compress yourselves into parts of your regions. In North America, only 1/4 of the region is arable, so farmers, would you move into 1/4 of the total space? (For Latin America, Africa, Europe, Asia and USSR, turn to chart at the end of this section. Continue as above.)

"Let's summarize what we've seen so far. We've shown the distribution of the world's population by region. We've looked at the urban-rural distributions of each region's population. And we've also seen the proportion of arable land in each region. This demonstration provides an answer to people who say, 'with all that land to farm, how can there be food scarcity?' We see that there is much less agricultural land per region than most people think.

"Finally, let's look at the protein consumption in these regions. This loaf of bread (hold up) represents protein consumption per day in the world. I have marked it off to show the difference in consumption among regions.

"North America gets 1/12 of this loaf. Would the North American ambassador please come up to get North America's share of the world's protein and distribute it among the population as you see fit.

"Latin America also gets 1/12 of this loaf. Would the Latin American ambassador. . . ."

(Proceed as above for the USSR (1/12), Africa (1/12), Europe (2/12) and Asia (6/12).

At this stage of the activity, interesting things might happen. Ask citizens to react to the conditions they observe or those to which they are subjected. For example, how do the people feel if the ambassadors keep too much food for themselves or don't distribute it fairly among the citizens? Will there be a revolution? Will some citizens steal food from each other? Will there be (legal/illegal) immigration to a country that has more food?

Collect the ambassadors' cards.

FOLLOW UP

There are several variations or "spin-offs" of this activity:

A. *Per Capita Gross National Product.* This variation uses Hershey's Chocolate Kisses to represent per capita Gross National Product (GNP) of each world region. You can obtain this information on each region from the "World Population Data Sheet", or you can ask students to look it up. Let each candy represent $100 per capita GNP. For example, North America has a per capita GNP of $9650 according to 1980 statistics. Thus, it would get 96 or 97 candies (contained in a plastic bag). Distribute the appropriate number of respective candies to each ambassador as before.

B. *Distribution of World Protein Per Capita.* Unshelled peanuts may be distributed to the ambassadors of the various regions according to both "ideal" and "real" world situations.

Before class, count out peanuts onto paper plates according to the table below. Jot down the figures on the edge of each plate for easy reference during the demonstration.

DISTRIBUTION OF PER CAPITA PROTEIN BY CONTINENT

Region	Number of Participants	Number of Peanuts (Ideal World)*	Number of Peanuts (Real World)
North America	3	9	9
U.S.S.R.	3	9	9
Europe	6	18	18
Latin America	4	12	8
Asia	29	87	58
Africa	5	15	10

*This figure is based on an optimum protein standard of 100 grams per person. Each peanut represents 33⅓ grams, so a well-fed person would receive three peanuts.

To demonstrate the difference between the ideal and the real, hold up the paper plate with the "ideal quantity" to show citizens of each region how much they "should" be getting. Then remove a portion of the peanuts in order to portray the quantity they will get in the "real" world. For example, ask the Asian ambassador to come forward and get the protein supply for Asia. If Asia were a well-fed region, all 29 citizens would get three peanuts each, for a total of 87 peanuts. Unfortunately, they get only 58 peanuts (sweep off 29 peanuts, perhaps pre-divided on the plate using a cardboard strip or plastic bag). Now ask the ambassador to distribute these peanuts as he or she sees fit, or according to the political realities of the region. Tell the Asian citizens that if their ambassador distributes the protein equitably, each citizen would get only two peanuts. (Repeat for other world regions.)

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit:*

- "Pop Needs"
- "Peanut Butter People"
- "When the Chips are Down"

From the *Global 2000 Countdown Kit:*

- "Food for the Future"

*From the *Food For Thought Kit*, Population Reference Bureau, 2213 M Street, NW, Washington, DC 20037.

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AMBASSADOR'S CARDS

(Based on 1980 statistics)

The African Ambassador

I am the African ambassador. Our population is estimated at 472 million; our birth rate is 46 per thousand, and our death rate is 17 per thousand. Our population is growing at an annual rate of 2.9 percent. At this rate our population will double in 24 years. By the year 2000 we are projected to have 832 million people. Our infant mortality rate is 140 per thousand, and our life expectancy at birth is 49 years. For every person there is approximately 1¼ acres of arable land.

The Soviet Ambassador

I am the Soviet Ambassador. Our population is estimated at 266 million; our birth rate is 18 per thousand, and our death rate is 10 per thousand. Our population is growing at an annual rate of 0.8 percent. At this rate our population will double in 82 years. By the year 2000 we are projected to have 311 million people. Our infant mortality rate is 31 per thousand, and our life expectancy at birth is 70 years. For every person there are approximately 2¼ acres of arable land.

The European Ambassador

I am the European Ambassador. Our population is estimated at 484 million people; our birth rate is 14 per thousand, and our death rate is 10 per thousand. Our population is growing at an annual rate of 0.4 percent. At this rate we will double in 176 years. By the year 2000 we are projected to have 521 million people. Our infant mortality rate is 19 per thousand, and our life expectancy at birth is 72 years. For every person there is approximately ¾ acre of arable land.

The Latin American Ambassador

I am the Latin American Ambassador. Our population is estimated today at 360 million. Our birth rate is 34 per thousand. Our death rate is 8 per thousand. Our population is growing at an annual rate of 2.6 percent. At this rate we will double in 26 years. By the year 2000 we are projected to have 595 million people. Our infant mortality is 85 per thousand, and our life expectancy at birth is 64 years. For every person there is approximately one acre of arable land.

The Asian Ambassador

I am the Asian Ambassador. Our population is estimated at 2.56 billion. Our birth rate is 28 per thousand, and our death rate is 11 per thousand. Our population is growing at an annual rate of 1.8 percent. At this rate we will double in 39 years. By the year 2000 we are projected to have 3.58 billion people. Our infant mortality rate is 103 per thousand, and our life expectancy at birth is 58 years. For every person there is approximately ½ acre of arable land.

The North American Ambassador

I am the North American Ambassador. Our population is estimated at 247 million people; our birth rate is 16 per thousand, and our death rate is 8 per thousand. Our population is growing at an annual rate of 0.8 percent. At this rate our population will double in 87 years. By the year 2000 we are projected to have 289 million people. Our infant mortality rate is 13 per thousand, and our life expectancy at birth is 73 years. For every person there are approximately 2⅓ acres of arable land.

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REGION INFORMATION CHART

The following chart provides information necessary for setting up and carrying out the "Food For Thought" simulation for each world region including: length of yarn needed, number of "citizens," and profile information.

The simulation is based on 50 participants. For 25 or fewer, simply double over the year and use half as many participants indicated below. For other numbers of participants, reduce (or expand) proportionally. Regions need not be arranged in rectangles, but could be free-form if desired.

REGION	AMOUNT OF YARN NEEDED	TOTAL NUMBER OF PARTICIPANTS*	REGION INFORMATION
North America	36 feet	three	16% of world's land area 6% of world's population 3/4 of population is urban 1/4 of land is arable
Latin America	35 feet	four	15% of world's land area 8% of world's population 2/3 of population is urban 1/3 of land is arable
Europe	18 feet	six	4% of world's land area 11% of world's population 2/3 of population is urban 1/2 of land is arable
U.S.S.R.	36.6 feet	three	16.5% of world's land area 6% of world's population 2/3 of population is urban 1/4 of land is arable
Asia	40 feet	twenty-nine	20% of world's land area 58% of world's population 1/4 of population is urban 1/3 of land is arable
Africa	42 feet	five	22% of world's land area 10% of world's population 1/4 of population is urban 1/3 of land is arable

*Based on 50 participants

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HI-LO*

GRADE: Upper Elementary to Intermediate
CURRICULUM AREA: Math, Social Studies
Language Arts,
Geography
CONCEPT: Population density

INTRODUCTION

Population density differs from geographic region to geographic region. Some parts of the U.S. have a much greater population density than others. In this activity, students will investigate these differences in densities.

After completing this activity, students will be able to list which states have the highest and the lowest densities and will be able to give their opinion on general lifestyle characteristics of persons living in those areas.

ACTIVITY

Materials: The "United States Population Data Sheet;" pencils; paper.

Procedure: Ask students to guess which are the five most densely and the five least densely populated states in the U.S. Record the guesses on the chalkboard and obtain a consensus from the opinions presented.

Tell students to check the "United States Population Data Sheet" and determine which, in fact, are the most and least densely populated states.

FOLLOW UP

Discuss answers to the following questions:

A. What factors do the five most densely populated states have in common? What do the least densely populated states have in common?

B. What are some factors that determine the number of people that can live in a state?

C. What are some positive factors about living in a populous state? What would be considered some negative factors?

D. What are some positive factors about living in a state with a relatively low population density? What factors would be considered negative?

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activity:

From the *Elementary Population Activities Kit*:

- "On the Charts"

*From *Population Education Activities for the Classroom* by Judith Schultz and Herbert L. Coon.

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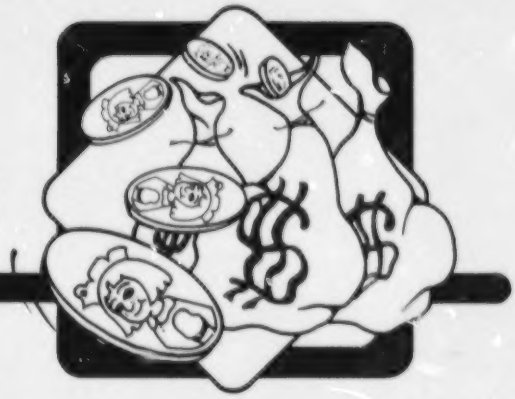
HOW TO SPEND $5 MILLION*

GRADE: Intermediate to Secondary
CURRICULUM AREA: Math, Social Studies
CONCEPT: Resource allocation



INTRODUCTION

There are many kinds of resources: natural resources, human resources, and technological resources. Most are finite; that is, they have definite limits. Therefore, it is important to use them carefully and wisely in order to obtain the best use over the longest time. This activity deals with a financial resource—money—and how best to use it.

After completing this activity, students will be able to make decisions and set priorities dealing with the allocation of resources.

ACTIVITY

Materials: Paper; pencil; hand calculator (optional).

Procedure: Divide the class into teams of about five students. Inform each team that it is the State Budget Committee. Allow each student committee to choose which state the students wish to represent. Have the committees also appoint chairpersons who will report the decisions their committees made. It is their task, as the State Budget Committee, to allocate $5 million left over after essential services are provided for in the budget. The committees must divide the $5 million among the following suggestions in rank order (with the highest first). It is possible to spend the entire amount on one item.

Suggestions:

- Raise public school teachers' salaries
- Hire more environmental protection enforcement agents
- Expand the state's soil conservation program
- Establish a jobs program for disadvantaged youth
- Reduce the state sales tax
- Strengthen the numbers and training of the state police force
- Improve the sewage treatment plant of the state's biggest city
- Establish a free transportation program for the elderly and handicapped
- Establish an arts and science program for gifted children in the schools
- Set aside a large parcel of land for a wildlife refuge

After each committee has completed its task, ask each chairperson to report how the money was allocated. The committee's decisions should be open to question. Decisions and defenses should be based on knowledge about state spending priorities, human and natural resource needs and other factors.

FOLLOW UP

To make each State Budget Committee's task more realistic, instruct them that there is a $5 million deficit and they must *cut* that amount from the list given. Again, decisions should be based on knowledge about state spending priorities, human and natural resource needs and other factors.

CROSS REFERENCES

This activity relates or is similar to the following ZPG population education activities:

From the *Elementary Population Activities Kit*:

- "When the Chips are Down"

From the *Global 2000 Countdown Kit*:

- "Bye Bye Birdie"
- "The Lion's Share"

*From *The Environment to Come: A Global Summary*. Population Reference Bureau 2213 M Street, NW, Washington, DC 20037.

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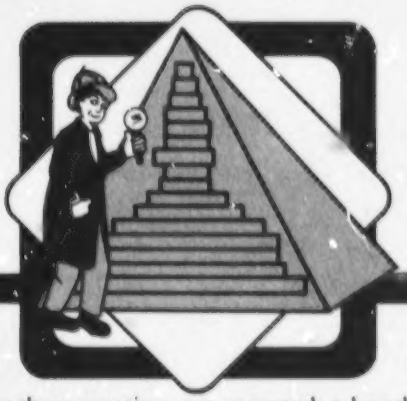
MYSTERY OF THE PYRAMIDS

GRADE: Upper Elementary
CURRICULUM AREA: Social Sciences, Math, Geography
CONCEPT: Age structure, birth rate, death rate



INTRODUCTION

It is unusual for the number of young people and older people in a country to be exactly the same. Instead, the age structure of a population tends to have proportionally more of certain age groups. The concept of age structure differences in populations is important in understanding population dynamics. Decisions regarding the use of resources are influenced by the size and needs of different age groups. These resource allocation decisions then have great impact on the lifestyle of the citizenry as a whole.

In this activity, students will prepare simplified age structure pyramids for two countries and from these models, hypothesize the effects that different sizes of age groups will have on the countries.

After completing this activity, students will be able to define population age structure and predict three attributes of a country given the relative size of a particular age group.

ACTIVITY

Materials: Two tall, straight-sided plastic or glass containers (quart jars will work); five cups of red dried beans; four cups of white dried beans; three cups of brown dried beans.

Procedure: Follow the indicated steps.

A. Introduce the idea of age structure by explaining that some countries have a larger percentage of young people while others have a higher percentage of middle aged or older people. Explain that the class will construct simple models of the age structure in Guatemala and Sweden. Then the class will discuss what this age structure means to people who live in each country.

B. Assemble the beans and jars at the front of the class. Explain that the red beans represent young people, the white beans represent middle-aged people and the brown beans represent older people.

C. Have two students come forward and measure the following "human beans" into two jars. Have the students pour the beans in evenly to create distinct layers.

1. Jar 1 (Guatemala): Three cups of red beans, two cups of white beans and one cup of brown beans.
2. Jar 2 (Sweden): Two cups of red beans, two cups of white beans, and two cups of brown beans.

D. Repeat again the age groups symbolized by the beans and ask the following questions: Would Guatemala or Sweden need more schools? More soccer balls?

E. After these questions are answered, ask each student to think about more differences. As the students respond, write a list of differences between the two countries on the board.

F. Review the differences to summarize the effects of age structure on a country. Then ask the students which country is probably growing faster. (Answer: Guatemala. It has a greater percentage of its citizens in the childbearing years.)

FOLLOW UP

A. For simplicity's sake, this example uses two countries with approximately the same size population (8 million). For an interesting math activity you can have the students explore the concept of percentage and proportions versus absolute number.

Indicate that the first jar is Mexico (population 76 million in 1983), rather than Guatemala, and ask which country (Mexico or Sweden) has the most older people? The greatest percentage of older people?

B. Students can "build" a variety of different age structure pyramids (large middle age class, large older age class, etc.) and report on resource use and lifestyles in these "countries." They can study the "World Population Data Sheet" to find countries with these hypothetical age structures.

C. Explore the causes of these differences in age structure. While an obvious cause of a rapid growth rate and a large younger age group is a high birth rate, the students might hypothesize that events such as wars or disease epidemics could cause disproportionate changes in the population. The effects of health care improvements can also be explored. (Improved health care both allows older people to live longer and reduces the infant mortality rate. Which effect is more significant?)

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit:*
- "When the Chips are Down"
- "Pop Needs"
- "School Pop Profile"
- "ZPG Island"

From the *Global 2000 Countdown Kit:*
- "The People Connection"

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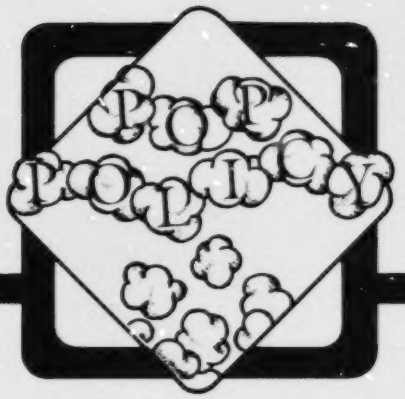
POP POLICY

GRADE: Secondary
CURRICULUM AREA: Social Studies, Political Science
CONCEPT: Planning and population policy



INTRODUCTION

There are a variety of concepts that must form the basis of sound population education. However, knowledge of concepts such as carrying capacity, exponential growth and age structure is important only because such knowledge enables us to seek positive changes. Collecting data, comparing alternatives and making decisions about needed improvements are part of the desired process in education in general. Certainly this is true for population education. In this activity, students will use some of the "facts" of population dynamics along with personal values to develop population policy. Although population policy-making is a challenge, it is probably no more difficult than dealing with other policy issues—national health insurance, tax-supported day care centers and the Equal Rights Amendment, for example.

After completing this activity, students will be able to state their opinion on a population issue. General policy objectives and a list of population issues are presented in the following section.

General Objectives in Population Policy

- To understand that population policy-making is a difficult task
- To discover that some population policies might not satisfy all values of a person or a group
- To identify a personal or group hierarchy of values relevant to population policy
- To realize that any proposed population policy might offend some groups or individuals
- To recognize that sound data is essential to policy formation
- To understand that some decisions might have to be made without sufficient information or reflection due to time constraints
- To understand that compromise is likely in making complex decisions in a group

Policy Issues

- Incentives or disincentives (penalties) regarding family size
- Federal versus private support of fertility regulation services and information
- Food or other aid to developing countries (Should it be contingent upon the existence of or commitment to a population program?)
- Immigration
- Land use and population redistribution

ACTIVITY

Procedure: Follow the steps as indicated.

A. Divide the class into small groups (approximately three to seven in each) and appoint a discussion coordinator who will also report on the group's conclusions.

B. Have each group choose one of the issues listed in the Introduction (or some population issue not listed) and use steps below to formulate a policy or policies to deal with that issue. Specify the country or region to which it applies. Have the discussion coordinators for all groups follow this sequence:

1. Brainstorm. What should be done about this issue? List as many actions as possible, ranging from outlandish, impractical and politically unfeasible ideas to sensible, just and responsible ideas. "Doing nothing about the issue" could be included on the list as well.
2. Eliminate ideas that are unethical, politically unfeasible, technically unsound or for some other reason impossible to carry out.
3. Identify the ideas that are simultaneously ethical, politically feasible and technically possible.
4. Come to a decision about which policy (policies) the group recommends. If a vote is taken, record numbers of "yes" and "no" votes.
5. Answer the following questions about the group's decision-making process and present a summary to the class:
   a. Did all members of your group agree about which policies were desirable and which were undesirable?
   b. Who or what will benefit from your group's policy? Who or what will be harmed or offended? What values are in conflict? What are the "trade-offs"?
   c. As a group, what values appeared to rank higher than others in making your decision—values such as survival versus freedom or vice versa?

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d. What information or research findings do you wish you had to help you formulate your policy? What assumptions did you make in the absence of data?

e. If there was disagreement in your group, how did you come to your final policy decision (vote, consensus)? Was the discussion based on data? Was there a spirit of cooperation? Or conflict? Was there much emotion? If so of what kind? Was there, at the end, compromise?

f. In what ways might your group's process of decision-making be like that of a country's policy-makers. (For example, policy-makers must consider conflicting interests and compromise. Solutions are not always easily reached.)

FOLLOW UP

It may be possible to find actual examples of population policy in the making for the students to explore and discuss. Local issues such as zoning and mass transportation are interrelated with population policy. Have students check local newspapers and clip articles that relate to population policy. State and federal legislative efforts to deal with the issue of immigration also make fascinating case studies. Have students contact state and federal legislators to obtain copies of bills that relate to population policy formulation.

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit*:

- "On the Charts"
- "ZPG Island"

From the *Global 2000 Countdown Kit*:

- "Roll on Mighty River"

*From "Population and the Environment: Getting the Student Involved" by Elaine Murphy. *Environmental Education Report*, July/August, 1978.

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POP QUIZ

GRADE: Intermediate to Secondary
CURRICULUM AREA: All
CONCEPT: Developing or assessing population-related knowledge base.

1. What was the population of the world in 1984?

   a) 900 million b) 2.2 billion c) 4.8 billion d) 7.4 billion e) 22 billion

2. How fast is the population of the world growing each year?

   a) .06 percent b) 1.7 percent c) 4 percent d) 10 percent e) 24.5 percent

3. If the world's population continues at the 1984 rate of growth, how long will it take to double?

   a) 10 years or less b) approximately 20 years c) approximately 40 years
   d) approximately 96 years e) approximately 140 years

4. True or False. There is a population explosion in the world today.

5. True or False. There is a population crisis in the world today.

6. Which has NOT been a major cause of the population explosion?

   a) increase in birth rates b) modern preventive medicine c) improved sanitation
   d) lower infant mortality e) longer life expectancy

7. What was the population of the United States in 1984?

   a) under 50 million b) about 81 million c) about 116 million d) over 236 million
   e) over 500 million

8. True or False. Now that the U.S. has reached, and is actually under, the replacement level birth rate (total fertility rate) of 2.1 average number of children per family, all U.S. population growth is due to immigration.

9. What portion of U.S. population growth is due to estimated legal immigration?

   a) 1 percent b) 5 percent c) 12 percent d) 15 percent e) 26 percent

10. Given current trends (excluding illegal immigration) when would the U.S. reach zero population growth (z.p.g.)?

    a) 1990 b) 2000 c) 2025 d) 2050 e) 2090

This quiz was adapted by Zero Population Growth, Inc. from "Population: Facts and Materials for the Classroom," by Carl A. Huether, *The Science Teacher*, Volume 41, No. 9, 1974.

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POPULATION QUIZ ANSWER SHEET

Q.1 What was the population of the world in 1984?

A.c) ***4.8 billion.***
It must be noted that world population figures are not precise counts but are the best estimates demographers can make.

Q.2 How fast is the population of the world growing each year?

A.b) ***1.7 percent in 1984.***
This represents a slight decrease in the recent rate of growth, 2 percent. Even at the lower rate, we are still adding 79 million people to our population each year, or over one million people every five days. Demographers believe that because of improved socio-economic conditions and greater access to family planning programs, the birth rate will continue to decrease. The world's growth rate is calculated by the following formula: birth rate minus death rate divided by 10.

Q.3 If world population continues at its present rate of growth (1.7 percent), how long would it take to double?

A.c) ***Approximately 40 years.***
Figuring the world's doubling time is calculated by the following formula: Simply divide the "magic number" of 70 by the annual percent of growth, or 70 ÷ 1.7, and the result is 40 years. This formula works for any country. Kenya is the fastest growing country in the world at 4.1 percent; at that rate, it would double in only 17 years.

Q.4 True or False. There is a population explosion in the world today.

A. ***True, if one defines "explosion" as a sudden occurrence.***
It took all of human time on earth (about 3 million years) to reach the first billion in 1800; it took 130 years to reach the second. The third billion was added 30 years later in 1960. In 1975 there were four billion people on Earth—another billion added in just 15 years. By the year 2000, it is projected that 6.1 billion people will inhabit the Earth.

Q.5 True or False. There is a population crisis in the world today.

A. ***There is no correct answer to this question since it involves values rather than facts.***
While a large majority of scientists and scientific organizations consider rapid population growth a major problem, others, such as economics professor Julian Simon and political analyst Ben Wattenburg, take a dissenting view. Some consider population growth an outcome rather than a cause of other factors such as poverty. At the World Population Conference in 1974, there were a few leaders of five rapidly growing, developing countries who said they wished to *increase* their populations. Nonetheless, most of these countries have, in the meantime, introduced population education policies. Clearly there is a range of viewpoints about the problem and proposed solutions.

Q.6 Which has NOT been a major cause of the population explosion?

A.a) ***An increase in birth rates.***
It has been a decrease in death rates, not an increase in birth rates, that is the main cause of rapid population growth. In Western Europe, death rates dropped during the Industrial Revolution (beginning in about the 1700's) contributing to rapid growth—one of the spurs to colonization of the New World. In the 20th Century, this drop in mortality took place in Latin America, Africa and Asia. Better nutrition, modern medicine and pesticides are thought to be major reasons for this decline. Since fertility remained at its previous high level, rapid growth resulted.

Q.7. What was the population of the United States in 1984?

A.d) ***Over 236 million.***

Q.8 True or False. Now that the U.S. has reached, and is actually under the replacement level birth rate (total fertility rate) of 2.1 children per family, all U.S. population growth is due to immigration.

A. ***False.***
The "replacement level birth rate" indicates the number of children per family that will *eventually* bring about a non-growing population: two children to replace the parents (plus an extra 0.1 to account for those who do not produce children and to balance an uneven sex ratio). This will not happen until births and deaths equal each other. Currently there are many more births than deaths—1.8 million more in 1984. This is partly due to the many people now in their childbearing years ("baby boomers" of 1945-1962). Even though they are having smaller families than ever before, these baby boomers are responsible for current natural increase.

Q.9. What portion of U.S. officially recognized population growth is due to net legal immigration?

A.c) ***26 percent.***
In 1981, 74 percent of U.S. growth was due to natural increase (births minus deaths); 26 percent was due to net legal immigration. This figure does *not* take into account *illegal immigration*, a largely unknown variable in the estimate of U.S. annual growth. Illegal entries each year range from 500,000 to one million or more; and the number of people now residing in the U.S. illegally is estimated at anywhere between 3 to 6 million. Given continued high illegal immigration, the achievement of zero population growth would be postponed almost indefinitely.

Q.10. Given current trends (excluding illegal immigration), when will the U.S. reach z.p.g.?

A.d) ***2050.***
Given current birth rate, death rate and legal immigration rate, the United States would stop growing in 2050 with a population of 309 million. However, these projections do not consider the impact of illegal immigration on population growth—which is substantial.
(See answer to number nine.)

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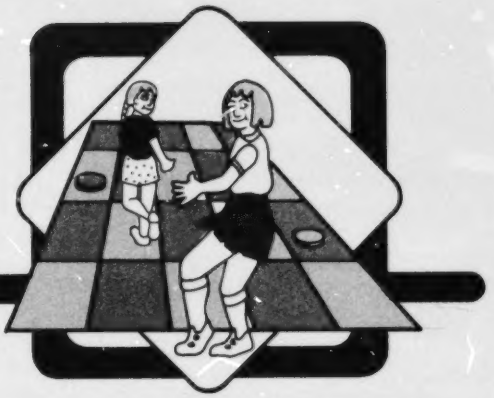
POPPO!*

GRADE: Secondary
CURRICULUM AREA: Social Studies
CONCEPT: Developing a population-related knowledge base



INTRODUCTION

The understanding of any area of interest depends on the acquisition of knowledge about the topic. Facts and figures and technical terms play an important role in the development of this knowledge base.

"Poppo!" is a game similar to Bingo. It is designed to help students learn the basics of population dynamics through positive reinforcement. The correct answers are the only logical ones. Thus, students feel encouraged by their "mastery" of the area while, in fact, they are learning it.

After playing "Poppo!," students will be able to list at least five basic facts about population concepts and issues.

ACTIVITY

Materials: Copy of Poppo Card for each student (see furnished sample); markers (beans or buttons work nicely); Sample Questions list (furnished); prizes (optional); index cards (optional).

Preparation: Each student will need a Poppo Card with answers indicated. Photocopy enough blank Poppo Cards so each player can have at least one. Transfer the answers indicated on the Sample Questions list to the cards. Make the order of the answers different on each card and put one answer per square. Cards need not have identical answers as long as all cards can potentially win. See the sample card provided.

For your use, you may wish to put questions on individual index cards in order to choose them at random more easily. Or you may retain them on the list provided. You can add to the list, of course.

Procedure: Distribute Poppo cards and markers. Explain that "Poppo!" is played in a fashion similar to Bingo. Read the fill-in-the-blank questions from the list or from the index cards. If the correct answer appears on their cards, the students should cover the square (put a marker on it). The center square on each card, "Poppo," is a free space. When a student fills one five-square line (horizontal, vertical or diagonal), he or she should yell "Poppo!" Check the answers. If the student has answered correctly, you may wish to give a prize. After each game, students may want to exchange cards and play another round.

SAMPLE QUESTIONS

- The sudden growth of world population in the 20th century is sometimes called (the population explosion).
- The population of the world in 1984 was (4.8 billion).
- The growth rate of the world in 1984 was approximately (1.7 percent).
- Dividing a certain number by the growth rate of a country will give you the number of years it takes for that country's population to double. What is that number? (70)
- At its 1984 rate of growth, 1.7 percent, world population will double in how many years? (40)
- Most of today's population growth is taking place in the (less developed countries).
- ***Make seven copies of this card.*** Name one policy that is likely to reduce birth rates (government encouragement of small families, family planning information and services, decrease in infant mortality, better distribution of income, raising legal age for marriage, education of women, career opportunities for women). Choose one answer for each card.
- The population of the United States in 1984 was approximately (236 million).
- The U.S., even with a low birth rate, grew by 2.2 million people in 1984 due to a combination of (immigration and more births than deaths).
- The percentage of people at young, middle and older age groups in a country is called that country's (age structure).
- A country with a high percentage of young people is likely to keep on growing, even if the birth rate goes down. This phenomenon is called the (momentum of population growth).
- The number of deaths per 1,000 people is called the (death rate).
- The number of births per 1,000 people is called the (birth rate).
- If there are more deaths than births, the world will experience (population decrease).
- When births and deaths are equal, as well as immigration and emigration, a country has reached (zero population growth).

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- ***Make eight copies of this card.*** Some experts believe that rapid population growth will have a negative impact on (clean water, ratio of jobs to workers, clean air, adequate housing, food supplies, industrialization, wildlife habitat, open space). Choose one answer for each card.
- ***Make two copies of this card.*** A decreasing birth rate may adversely affect (diaper manufacturers, elementary school teaching jobs). Choose one answer for each card.
- The movement of people within a nation is called (internal migration).
- To move to a country of which one is not a native for the purpose of permanent residence is called (immigration).
- The trend of a population to leave rural areas to move to cities is called (urbanization).
- The number of people per a standard unit of space such as per square mile is called (population density).

*From "Population and the Environment: Getting the Student Involved" by Elaine Murphy. *Environmental Education Report.* July/August, 1978.

POPPO CARD EXAMPLE 1

education of women	population explosion	family planning information and services	death rate	birth rate
decrease in infant mortality	momentum of population growth	70	1.7%	population density
open space	better distribution of income	POPPO!	4.8 billion people	urbanization
diaper manufacturers	population decrease	raising the legal age for marriage	zero population growth	236 million people
less developed countries	40 years	age structure	more births than deaths plus immigration	food supplies

POPPO CARD EXAMPLE 2

elementary school teaching jobs	government encouragement of small families	family planning information & services	career opportunities for women	population density
zero population growth	internal migration	immigration	urbanization	age structure
momentum of population growth	adequate housing	POPPO!	clean water	ratio of jobs to workers
70	less developed countries	food supplies	1.7%	wildlife habitat
clean air	40 years	4.8 billion people	industrialization	236 million people

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THE STORK AND GRIM REAPER

GRADE: Upper Elementary to Intermediate
CURRICULUM AREA: Social Studies, Natural Science
CONCEPT: Carrying capacity, birth rate, death rate

INTRODUCTION

Carrying capacity is a relatively simple concept in biology, but it is one that frequently is overlooked. Even when it is considered, the concept often is posed in terms of how many rabbits can live on an acre or how many cattle can be raised in a particular pasture. However, carrying capacity applies to human beings, too.

Unlike the situations with rabbits and cattle, human beings must include the quality of life when carrying capacity is considered, not just the availability of resources needed to sustain life. The basic goal of many population programs and organizations is to aid in achieving an environment where the number of individuals is in balance with resources available and where a quality life can be sought with a fair chance of success.

This activity will convey the concept of the carrying capacity of the Earth. It will illustrate how a birth rate that is higher than the death rate affects the ability of the Earth to sustain that growth.

After completing this activity, students will be able to define the term "carrying capacity" and predict the effect that changes in an environment will have on that environment's carrying capacity. They will also be able to state how they feel about the human carrying capacity of a crowded area versus a sparsely populated area.

ACTIVITY

Materials: The "World Population Data Sheet" (included in this resource kit); clear container (plastic box or aquarium with at least a one-quart capacity); old towel; two sheets of paper labeled: "Stork" and "Grim Reaper"; straight pins to attach labels to wearer; bucket of water; food coloring; two measuring cups or dippers (one large—perhaps two-cup; one small—one-cup).

Preparation: Pin up the "World Population Data Sheet" near the demonstration area so people can refer to it. Fill the bucket with water. Add food coloring to make water more visible inside the clear container. Place the clear container with a towel under it on a table in front of the audience.

Procedure: Call for two volunteers from the class or pick two students to assist. Assign one to be the "Stork" and the other to be the "Grim Reaper." Pin the "Stork" and "Grim Reaper" labels on the respective individuals.

Next, hold up the clear container and explain that it represents the world. Then point out that the colored water in the bucket represents people.

Assign the Stork the task of adding people to the world, that is, pouring dippers of water into the container. In contrast, tell the Grim Reaper to take people from the world by dipping water out of the container.

Before the Stork and Grim Reaper begin their tasks, ask students to refer to the "World Population Data Sheet" to determine the birth rate and death rate of the world. (They will find out that the birth rate is more than double the death rate.)

Based on the students' findings, ask them who should receive the large dipper (Stork) and who should use the small dipper (Grim Reaper). When correctly answered, signal the Stork to start adding dippers of water into the container. Direct the Grim Reaper to remove water. And direct them to continue in turn while the class observes. When the water level nearly reaches the top of the container, tell the Stork and Reaper to stop. Ask students to explain why the water level rose steadily and what this would mean if the glass container really was the world.

It probably is not necessary to dip until water overflows the containers, but students should realize that overflow really signifies that the Earth's carrying capacity has been exceeded and that people cannot survive. Emphasize that losing water means losing people.

FOLLOW UP

There are several variations of this activity. Maybe you would like to show the different growth rates of two countries, for instance a developing country with a high growth rate and a developed country with a lower growth rate. You can obtain the information you need from the "World Population Data Sheet." To do this, you could use two containers—each representing one of the countries—with a Stork and Grim Reaper for each. Both sets of people would have to work at about the same speed, with the different growth rates shown by variations in sizes of dippers. The more slowly growing country, of course, would have a more slowly rising water level.

Perhaps you would like to show legal immigration and emigration for the U.S. You could use a thimble for emigration, a one-cup dipper for the birth rate, a half-cup dipper for the death rate and a half-cup dipper for immigration.

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In another variation, you or the students can call out the name of a country or continent, perhaps at a certain date in history, and the Stork and Grim Reaper can adjust their speed and/or the size of their dippers to correspond to the birth and death rates of that particular time and place. (Example: During the Black Plague era in Europe, the Grim Reaper would be very busy!)

A variety of activities and discussions are possible to make the concept of carrying capacity relevant to the student's own world:

A. You can have the students calculate the carrying capacity of their classroom. Before they begin, they will need to consider the following questions: How large is the room? How much space does each person take? How much space is taken by resources: tables, chairs, desks, etc.? How much open space is needed to have the class run smoothly? Does each person occupy one space only (one chair) or does he or she need more resources (one chair and one lab station for example)? Is there any emigration or immigration? What else should be considered before responding?

B. You can pose problems to the students concerning real situations. For example, how many frogs can a certain pond support? What happens if we increase that population by adding additional frogs? How many goldfish can live in one aquarium? What happens if we put more fish in it? How could we determine a farm's carrying capacity for cattle? Why will an acre support only so many trees?

C. Have students estimate the carrying capacity of their own homes, taking into consideration the number of people who could regularly eat and sleep there.

D. Have each student select a nearby geographic region—a lake, island or mountain range—and list at least 15 forms of life known to exist there. For each form of life, ask the students to list three limiting factors that affect it. Then have the students list as many limiting factors as they can that affect human beings.

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit:*

- "More Equals Less"
- "More or Less"
- "Crowding Can Be Seedy"

From the *Global 2000 Countdown Kit:*

- "Food for the Future"
- "Where Do You Get All Your Energy?"

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THERE'S A CONNECTION!

GRADE: Intermediate to Secondary

CURRICULUM AREA: All

CONCEPT: Interrelationships among global population, resources and environment.

INTRODUCTION

Based on ZPG's *Global 2000 Countdown Kit*, this activity is designed to illustrate important global interrelationships by what might be called a "systems approach." It is important to encourage students to think of these interrelationships—no matter how simplistic—in order to contribute to the understanding of the impact of one factor on others. Making these connections is a very important part of adult decision-making.

During this activity students will develop organizational and decision-making skills. After completing this activity, students will be able to state at least three interrelationships that exist among population, resources and the environment.

ACTIVITY

Materials: Blank systems model sheets—one for each student; pencils, newsprint, markers.

Procedure: Follow the steps as indicated.

A. Break the class into small groups of three to six people. Have each group choose a recorder and a reporter. Pass out the systems model sheets (on side 2) and assign each group one concept from that sheet.

B. Explain that these concepts are some of the major concepts covered by the *Global 2000 Report to the President*, released in 1980. This was a major U.S. study that looked at global interrelationships between population, resources and environment.

C. Ask each student to work alone for a few minutes to map out possible relationships between two concepts. For example, what effect does population have on water (more people less water, more people more water pollution, etc.).

D. Then ask the students to work in their groups to brainstorm as many connections as possible between their assigned factor and all other factors listed on the systems model sheet. What is the impact of their factor on all others? Allow 10 minutes.

E. After the 10-minute brainstorming session, have each group choose the five strongest links in their respective systems. Allow five minutes.

F. Have the reporters quickly share their links with the entire class. If time and space permit, draw a large systems model on the chalkboard or on newsprint. Have the reporters write their groups' links on the board or the newsprint.

NOTE: Brainstorming is an activity made popular by futures educators because it stimulates creative thinking. However, certain rules must be followed:

- Have each person try to think of as many connections as possible—even if they seem outrageous.
- Do not evaluate the ideas at this stage.
- Have the recorder write down all ideas given. Encourage even off-beat ideas. They may not be usable, but they may trigger other ideas that are.

FOLLOW UP

The sophistication and quality of the answers in the preceding activity will depend on the knowledge of the students participating in it. One possibility is to use the activity as a pre-test/post-test with a unit of study on population and the environment. Conduct the activity before and after the unit. The number and types of linkages your students can make will demonstrate how well the unit worked. You can also assign each student a concept to develop for homework or to research in the library.

Discuss the statement, "Everything is connected to everything else," which is sometimes called the First Law of Ecology.

Another way to explore the "systems approach" is from the "bottom line." Please note that in the first activity, the parameters or factors to which links are drawn were predetermined. These included energy, population, fisheries, income, etc. "Future Wheel," created by Jerry Glenn and Cyndy Guy, begins with a single factor, in this case population, and builds a network of interrelationships from that one factor.

Ask students to construct a Future Wheel by placing a concept such as "more people" in the central circle (as shown in the sample) and then connecting to it possible consequences or subsequent results of that central factor. The more students know about population the greater the number of interrelated factors they can attach. Note that even when we use technology, ultimately we depend on the natural systems of air, water, soil and other resources of the Earth.

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CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit:*

- "More or Less"

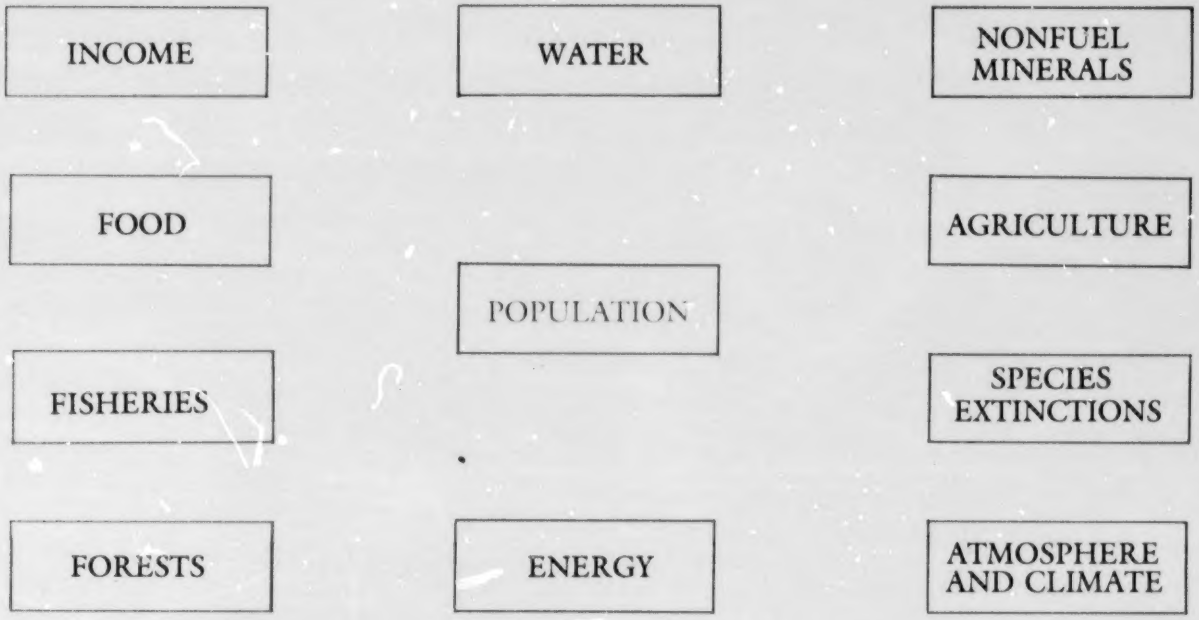
From ZPG's *Global 2000 Countdown Kit:*

- "Teachers Overview"

*Future Wheel**

*Created by futurists Jerry Glenn and Cyndy Guy. Illustration from *Growth Implications and the Earth's Future*, Education Development Center, 55 Chapel Street, Newton, Massachusetts 02160.

A SYSTEM'S APPROACH: CONNECTIONS



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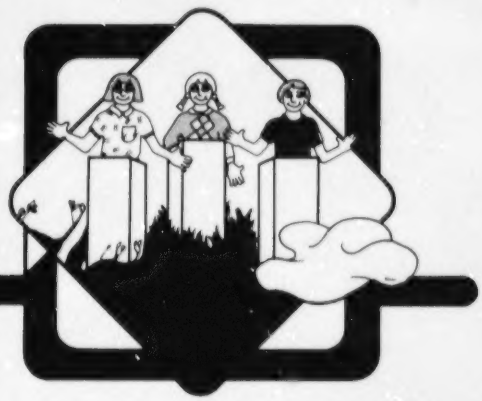
YOURS, MINE OR OURS?

GRADE: Intermediate to Secondary
CURRICULUM AREA: Social Studies, Political Science
CONCEPT: Values clarification and resource allocation



INTRODUCTION

The old adage, "Where a man stands on an issue often depends on where he sits" may have referred to a Senator's seat in Congress, but it is an apt summary of how personal beliefs are determined by a variety of personal factors.

In this activity, students will engage in a simple values-clarification exercise. This will allow them to see where they stand on particular issues. They then explore a hypothetical problem to see how values and practical considerations interact in resource allocation problems.

After completing the activity, students will be able to state how they feel about a particular environmental issue and hypothesize about future trends in resource use given a particular set of starting circumstances.

ACTIVITY

Materials: Copies of the "Shipwreck Island Map".

Procedure: This activity has two parts. Follow the steps indicated to complete the activity.[1]

A. Designate one side of the classroom "Strongly Agree" and the other side "Strongly Disagree." Read the following statements (or make up your own) and ask your students to stand in the part of the room that reflects their opinion. Students can also stand closer to the middle if they merely agree or disagree but do not feel strongly about the issue. Ask students to explain why they have taken a particular stand.

1. In a real crunch, jobs are more important than environmental quality.
2. Our current environmental protection laws are adequate; more stringent laws will cost too much.
3. Good farm land should not be used for shopping centers, housing developments and other urban uses.
4. Enforcement of existing environmental laws is more important than enacting new environmental laws.
5. Food aid to developing countries should be tied to reform of land ownership in those countries.
6. Development aid should be given only when the development will benefit the poor and women.
7. Much more land should be set aside for wilderness areas with limited public access.
8. The next century is likely to be a better time to live than the present.

B. Draw a shipwreck island map for this activity, duplicate it for distribution to the class, and explain the following scenario.[2]

> "Some 200 years ago 100 men, women and children were shipwrecked on an island that had abundant natural resources. Some domestic animals and tools also survived the wreck. Draw your idea of how the island would look 200 years *after* the shipwreck. What are your assumptions about population change, technology and government on this island?"
>
> Have the students work alone or in small groups to produce their drawings on the map and present their predictions to the class.

FOLLOW UP

Students could take each of the statements in the first part of the activity and use it as the basis for an issue paper or formal debate. The map could become a class project with a written "history" of the island. The students also could provide art, poetry and music composed by the islanders. Different groups could be given similar but slightly different scenarios for the island. For example, what happens if the shipwrecked survivors knew how to make iron? If they didn't possess this knowledge? They had books and paper? They had no books or paper, etc.? Have the students work as groups to see how the islands develop and then compare what effects these differences in technology resources may have had.

CROSS REFERENCES

This activity relates or is similar to the following additional ZPG population education activities:

From the *Elementary Population Activities Kit*:

- "More Equals Less"
- "More or Less"

From the *Global 2000 Countdown Kit*:

- "The Lion's Share"
- "Roll on Mighty River"

[1]From *The Environment to Come: A Global Summary*. Population Reference Bureau, 2213 M Street, N.W., Washington, D.C. 20037, 1983.

[2]From Unit IV (BP923) of *Man and Nature*, Biological Sciences Curriculum Study.

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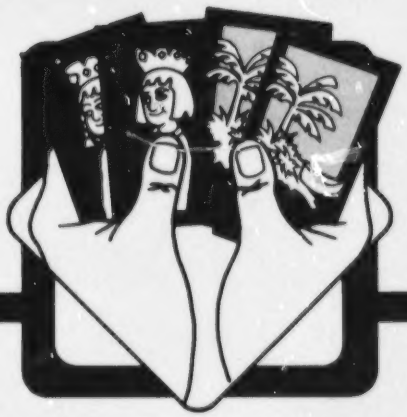
ZPG ISLAND*

GRADE: Upper Elementary
CURRICULUM AREA: Math, Social Studies, Language Arts
CONCEPT: Zero population growth



INTRODUCTION

Populations grow because of births and immigration and decrease as a result of deaths and emigration. A population only stops growing when births plus immigration are equal to deaths plus emigration. A stable, non-growing population (zero population growth) has been reached or nearly reached in seven countries: Austria, Belgium, East Germany, West Germany, Luxembourg and the United Kingdom.

After completing this activity, students will be able to define the term "zero population growth" and state three basic needs of people.

ACTIVITY

Materials: "ZPG Island Score Cards" (master provided), and one deck of playing cards for each group.

Preparation: Obtain the materials, divide the playing cards into red and black cards and divide the class into groups of four.

Procedure: Explain to the groups that they occupy a small island with limited resources. It has been determined that if the population exceeds 21, some people will suffer malnutrition and, perhaps, starve. However, if the population falls much below 21, there will not be enough workers to harvest the food and to construct shelters for protection from storms. Each group of four is given a deck of cards Each person in the group receives a score card and each player keeps score. The object is to obtain a population of 21 or as close to 21 as the player can. Explain the following rules:

A. All face cards have a value of 10. (Aces may be counted 11 or one.)

B. Number cards are equal to the stated number.

C. Red cards are population growth cards. (Hearts equal births, diamonds equal immigration.)

D. Black cards are population loss cards. (Spades equal death and clubs equal emigration.)

E. Players may decline to draw at any point and choose to stop playing.

F. Players draw from both the red cards and the black cards on every turn taken.

To start the game, each player draws a card from the deck. The highest draw is the first player to take a turn. Each player starts with a score (population) of 10 persons. Each player draws from the red cards first, adds up the score, then draws from the black cards and subtracts from the score. Players "go out" when they have scored more than 21, when they reach zero or a negative number, or when they have taken 10 turns. After all players have gone out, scores are checked and the player reaching 21 or closest to 21 is the winner. Red and black cards are kept separate for all games.

FOLLOW UP

Have the class consider the following situation:

You are in a dilemma! You and the other 20 people on your island have managed to harvest enough food for the winter. You have just finished building shelters and the bad weather is near. A boat lands on your island with 10 starving people who have left their island because of sickness on it. They want to stay with you and seem desperate. Your council calls a meeting to decide what to do about the newcomers. A decision must be made and the choices appear to be:

A. Don't let the people stay.

B. Let them stay for a day or two, give them some food and then send them away.

C. Let them stay as long as they wish.

D. Let them stay, but if they become ill send them away.

You are a council member. How would you vote? Can you think of any other alternatives?

*From ZPG's *Elementary Population Activities Kit*.

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ZPG ISLAND SCORE CARD

Draw	+ Born or Immigrating	— Dying or Emigrating	= Total
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

At the end of 10 draws, add up the totals from each draw to get the GRAND TOTAL. Person with GRAND TOTAL closest to 21 wins.

GRAND TOTAL _____

*Remember, each person starts out with a total of 10 people.

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EVALUATION

Please evaluate this Kit and return the enclosed form to: ZPG Pop Ed Program, 1346 Connecticut Avenue, N.W., Washington, D.C. 20036. Your name and address are necessary only if you wish additional information.

My occupation is _____

I work mostly with (grade or age level) _____

The city/state in which I work is _____

- This kit was ☐ easy ☐ difficult to use because _____
- The directions for activities were ☐ self-explanatory ☐ difficult to follow
- I used the following activities _____
- The activities were ☐ too easy ☐ about right ☐ too difficult for my grade/age level.
- My students ☐ do ☐ do not seem able to relate these activities to experiences and events around them.
- I have received parental ☐ commendation ☐ concern over the use of these materials.
- I have received peer/administration ☐ commendation ☐ concern over the use of these materials.
- My students ☐ dislike ☐ like to use these activities because _____
- I plan to use these activities ☐ on a one-time basis ☐ as a part of a particular unit ☐ throughout the year.
- These materials ☐ do convey ☐ do not convey population concepts better than other resources and activities that I have used.
  My preferred resources/activities are _____
  I like them because _____

Further suggestions/comments on overall package or individual activities:

Thank You. Please return this form to:
ZPG, Pop Ed Program, 1346 Connecticut Ave., NW, Washington, D.C. 20036

I would like further information on your:

_____ *Elementary Population Activities Kit*

_____ *Global 2000 Countdown Kit*

_____ Population Education Teacher Training Workshops

Name _____

Address _____

City/State/Zip _____

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ZPG

An Idea with a Future

UNITED STATES — Population Growth and Change

GROWTH

1983 Population: over 234 million

The U.S. — world's fourth most populous nation — is also among the fastest growing of all industrialized nations. With over a 1% annual growth rate, we add well over two million people yearly.

Natural increase (births exceeding deaths) accounts for over half that growth, and immigration (legal and illegal estimates) accounts for the rest (40-50%).

Natural Increase	Immigration (legal)	Immigration (illegal)
1.7 million	480,000	3-500,000*

The U.S. adds almost four times the population equivalent of another Washington, D.C. each year, a New Jersey every three years, and a California every decade.

CHANGE

We are, as a people, becoming more crowded, older in median age, and moving westward.

The populations of the South and West are growing rapidly, and they now exceed that of the North and East. 42% of all U.S. population growth between 1970-1980 occurred in just three states: California, Texas and Florida. That trend is continuing. The ten most densely populated states, however, are in the Northeast.

Our median age continues to rise, from 28 (1970) to 30.6 (1982). America's older population (65 & over) grew nearly 30% from 1970 to 1980. The 1983 elderly population estimate: 27.4 million (11.7% of the population).

YEAR 2000

GROWTH

Population Projection: 267.5 million (over 18% increase from 1980).

High regional birth rates, interstate movements and immigration will continue to swell the populations of the West (45% increase between 1970-2000) and the South. The Midwest population will remain basically the same, while the Northeast will decline in numbers.

California, Texas and Florida will be the three largest states in 2000. New York, now second largest, will drop by almost 15% in population. Florida will gain 79%. Largest increases will be: Nevada (140%), Wyoming (113%), and Arizona (105%). Only ten states will decline in numbers, with most dramatic drops in New York (−14.6%) and District of Columbia (−41%).

CHANGE

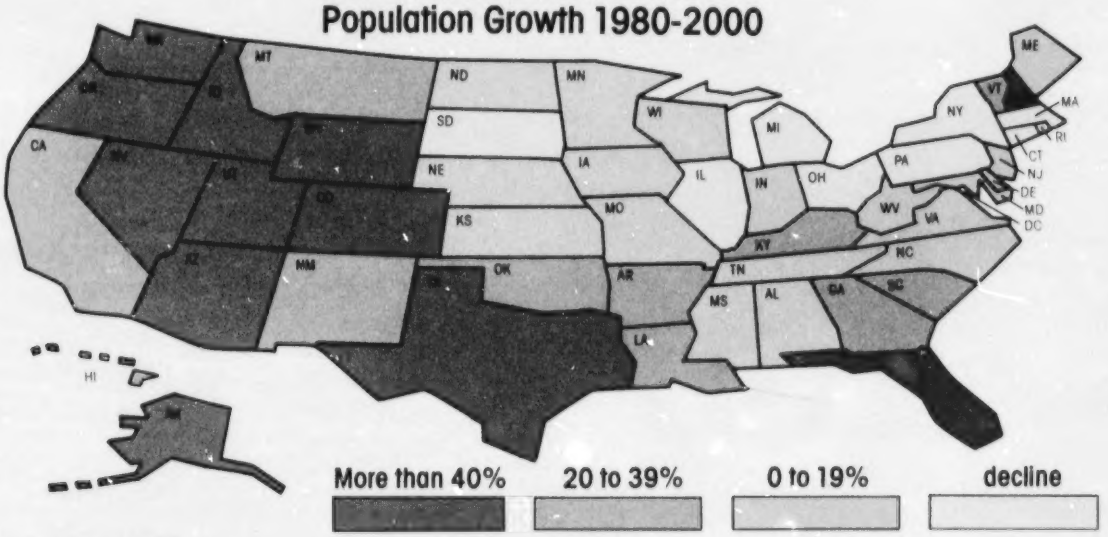
America's elderly population will continue to increase both in numbers and in percent of the total population, growing by 37% between 1980-2000.

1980:	1983:	2000:
25.5 million (11.3% of total)	27.4 million (12%)	35 million (over 13% of total)

As the "baby boom" generation ages, the older population will double it's numbers from 1980, hitting 50 million by the first quarter of the century, and 67 million (21% of the population) by 2050.

Here is a look at our states in the year 2000:

Population Growth 1980-2000



Detailed Projections by State

	Population in 2000	Change From 1980		Population in 2000	Change From 1980		Population in 2000	Change From 1980
Alabama	4,415,300	Up 13.5%	Louisiana	5,159,800	Up 22.7%	Oklahoma	3,944,500	Up 30.4%
Alaska	630,700	Up 57.5%	Maine	1,308,000	Up 16.3%	Oregon	4,025,300	Up 52.9%
Arizona	5,582,500	Up 105.4%	Maryland	4,581,900	Up 8.7%	Pennsylvania	11,207,600	Down 5.6%
Arkansas	2,835,400	Up 24.1%	Massachusetts	5,490,400	Down 4.3%	Rhode Island	925,800	Down 2.3%
California	30,613,100	Up 29.3%	Michigan	9,207,600	Down 0.5%	South Carolina	3,907,100	Up 25.3%
Colorado	4,656,600	Up 61.2%	Minnesota	4,489,400	Up 10.1%	South Dakota	687,600	Down 0.4%
Connecticut	3,062,400	Down 1.5%	Mississippi	2,939,200	Up 16.6%	Tennessee	5,419,600	Up 18.1%
Delaware	638,200	Up 7.2%	Missouri	5,080,200	Up 3.3%	Texas	20,739,400	Up 45.8%
Dist. of Columbia	376,500	Down 41.0%	Montana	963,000	Up 22.4%	Utah	2,777,400	Up 90.1%
Florida	17,438,000	Up 79.0%	Nebraska	1,661,900	Up 5.9%	Vermont	625,000	Up 22.2%
Georgia	6,708,200	Up 22.8%	Nevada	1,918,800	Up 140.1%	Virginia	6,389,400	Up 19.5%
Hawaii	1,277,700	Up 32.4%	New Hampshire	1,363,500	Up 48.1%	Washington	5,832,500	Up 41.2%
Idaho	1,512,200	Up 60.2%	New Jersey	7,427,600	Up 0.9%	West Virginia	2,067,700	Up 6.1%
Illinois	11,187,500	Down 2.0%	New Mexico	1,727,300	Up 32.9%	Wisconsin	5,215,500	Up 10.8%
Indiana	5,679,200	Up 3.4%	New York	14,990,200	Down 14.6%	Wyoming	1,002,200	Up 112.9%
Iowa	2,972,100	Up 2.0%	North Carolina	6,867,800	Up 16.9%	**U.S.**	**267,461,600**	**Up 18.1%**
Kansas	2,494,400	Up 5.6%	North Dakota	682,000	Up 4.5%			
Kentucky	4,399,900	Up 20.2%	Ohio	10,356,800	Down 4.1%			

Zero Population Growth, Inc.
1346 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 785-0100

All data and projections are by U.S. Census Bureau, unless otherwise noted. Projections presume small decrease in mortality, small increases in birth rates, and continuation of migration patterns.

*Estimates of annual illegal immigration range from 100,000 to one million, according to demographic experts.

interchange

Population Reference Bureau, Inc.

Population Education Newsletter

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A Teacher's Guide To. . .

The Global Environment

This issue of *Interchange* is accompanied by a 12-page reading, *The Environment to Come: A Global Summary.* The idea for the material came from a realization that there is widespread confusion about the state of the environment both from a national and an international perspective. Articles in magazines and newspapers, and television and radio programs describe oil shortages one day and oil gluts another. We hear about deadly pollution and about success in cleaning up water and air. Some analysts warn that the path we are taking leads to disaster while others assert that the world is getting better and better.

No wonder the public is confused, among them teachers and students. But—how to clear up the confusion? What *is* the truth?

An essay by Robert Hanvey deals with this question from an educator's point of view:

*The Teacher's Dilemma**

Suppose there is a community of people who live on the edge of a cliff, where the view is breathtaking. People keep moving into the community and building homes along the cliff edge. One day a resident of the community makes some tests and comes up with some distressing news. If any more homes are built along the cliff the whole face of the cliff may break off and take the community along with it. It's a long way down and that will *really* be breathtaking. Nonsense, say some of the other residents, the rock is perfectly solid and you can safely continue to build new homes. In fact, the prosperity of the community depends on it. There is thus a lively debate. And it isn't just an argument over trifles. The very existence of this group depends on the judgments that are to be made.

Suppose you are a teacher in this cliff community. How will you educate the children about this problem and issue? Will you warn the children to leave the community? Will you consider your duty done if you inform them of the different positions being argued. Will you suggest that they make up their own minds and then join in the debate? Will you set an example by making a decision to build yourself a house (a) on the cliff edge or (b) safely to the rear? Will you decide that the matter is too profound, too disturbing, or too complex for children to encounter?

The world community may be in a situation like this. Poised on a cliff that may be very durable—or that may give way. Technical experts disagree: Continued growth will bring disaster, say some; continued growth will bring solutions, say others. Still others argue for selective growth—some there, none here.

The dilemma for those who teach the young is—what and how do you teach about momentous issues, world developments that may impinge in very direct ways on all our lives, *when the "best minds" cannot agree on the significance of what is happening.*

Should the schools amplify and broadcast the warnings of "sentries"? Every society has its warning systems. The sentries are those who guard the frontiers (of time as well as space). Watch out! they call. And the schools might take up those warnings, spread them more widely, explain them. Those who wrote *The Limits to Growth* are sentries. Shall we pass the warnings along?

*From *Intercom 77, Explorations in the Emergent Present*, by Robert Hanvey. Copyright © 1974 by Global Perspectives in Education, Inc., 218 East 18th Street, New York, NY 10003. Reprinted by permission.

By Mike Peters for the Dayton Daily News

GEE... A THREE BEDROOM HOUSE FOR ONLY TWO HUNDRED BUCKS... WHAT'S THE CATCH?

Teachers often use cartoons to spark discussion of global issues.

One solution, of course, is to pass the warnings along but "balance" them with counterarguments....

If one does the balancing act—A says this but B disagrees—you may end up with students who know in a cold dispassionate way that somewhere out there a sentry is shouting warnings—but they don't much care. You have alerted them but comforted them at the same time. And they have other things on their minds.

There is no beautifully wrapped solution to this dilemma. Individual teachers will solve it (by commission or omission) in their own ways. But we can probably agree on some minimal functions distinctively within the purview of schools. First, it probably is appropriate that the schools pass along the warnings of the "sentries." This is the kind of information that must be freely distributed, *even if it turns out eventually to be invalid.* The schools are not in a position to judge the good sense or the veracity of the sentries. But we'd all better know that there are cries of alarm on the outskirts.

Second, the schools can educate the young to comprehend the reason for the alarm *in as sophisticated a way as possible.* This means, in our day and age, that students must learn the pertinent technical concepts. It is not enough to hear the simple cry of alarm about growth. Various kinds of growth must be understood in some technical sense. The mass media are good transmitters of alarm; they are not very good at technical details. That is something the schools can do.

Third, the classroom with all its drawbacks provides an arena in which students can "play" (in the best sense of that term) choice-making and problem-solving roles. Play is one of the important ways in which primates learn, human primates included. At the present time choice making and problem solving are beginning to assume new forms. The schools can invite the young to play choice-making roles that are true to the emerging forms in the larger society. That means, among other things, the use of computer models of the future, and ways of forecasting that make explicit assumptions about how various factors interact and that enable the testing of various alternative policies.

Finally, the classroom is a place where feelings and values and ethical stances can be brought to the surface and examined.

One might add to this thoughtful analysis that the classroom is also a place which can inspire action on the part of students: political action such as writing to legislators, community action such as recycling alumnium cans, and personal action such as reducing energy use in the home.

Since there is no objective "truth" about the current state of the environment and no crystal balls to give us a glimpse of the future, we must rely on the best that is known and thought. The Population Reference Bureau has turned to six major global reports to find what agreement exists among the experts who have studied population, energy, minerals, and food among other environmental topics. *The Environment to Come* is a distillation of the findings and recommendations of these studies. There is also a brief section of excerpts from Herman Kahn's *The Next 200 Years* and *The Coming Boom* and Julian Simon's *The Ultimate Resource*; these writers are considered an optimistic minority among those who study world environmental and economic trends.

Additional copies of *The Environment to Come: A Global Summary* and this issue of *Interchange* are available from PRB at the following prices: $2 per single set; two or more sets, $1.75 each. Include $1.00 for shipping and handling if your order is under $20.

In The Classroom

The Environment to Come stands by itself as a student reading or reference material. However, for those teachers who would like to build class activities around it, we offer the following suggestions.

Environmental Quiz

The true-false quiz below can be used to arouse interest in the reading beforehand or to test understanding of the issues after the reading. An "open book" test makes finding the answers less threatening. (Answers are given after each statement for the teacher.) Please note: there is some room for debate about the answers; challenges can provide a basis for good discussion.

1. Population trends, resources, pollution, and food production are interrelated. (T)
2. When the price of oil rose dramatically, in the 1970s, it had an adverse effect on food production in the third world. (T)
3. The world's population is likely to double by the end of this century. (F)
4. About 90 percent of the population growth that will occur by the end of the century will be in the less developed countries. (T)
5. By the year 2000, over half the world's people will live in urban areas. (T)
6. The current oil glut is caused by new discoveries of large deposits of petroleum. (F)
7. Finite fuel sources—oil, coal, natural gas, oil shale, tar sands, and uranium—are sufficient for the next century or longer. (T)
8. The shortage of fuelwood for the

poor is one cause of deforestation in less developed countries. (T)
9. Most studies conclude that the transition from oil to other energy sources will take from 15-20 years. (F)
10. By the year 2000, the developing countries are expected to consume seven times more energy per capita than the developed countries. (F)
11. Even though nonfuel minerals have been extracted and consumed in the 20th century at very high rates, reserves of many minerals have increased over the years. (T)
12. In most cases, countries which possess or process minerals are not the chief consumers. (T)
13. Population growth is now pushing against the physical limits of food production. (F)
14. In the past few decades, worldwide food production has more than doubled. (T)
15. Most experts conclude that while population growth exacerbates the problems, the chief cause of hunger is poverty. (T)
16. In South Asia and Africa during the 1970s, food production per capita rose considerably. (F)

The following activities deal primarily with attitudes and values about environmental choices.

Take a Stand!

Designate one side of a wall "strongly agree" and the other side "strongly disagree." Read the following statements and ask students to stand in the part of the room that reflects their opinion. Students can also stand closer to the middle if they merely "agree" or "disagree" but not strongly. Ask students to explain why they've taken a particular "stand."

If this activity is too cumbersome, students may respond from their seats by indicating "thumbs up" or "thumbs down" in agreement or disagreement with the statements.

Statements

1. In a real crunch, jobs are more important than environmental quality.
2. Our current environmental protection laws are adequate; more stringent laws will cost too much.
3. Arable land should not be used for shopping centers, housing developments and other urban uses.
4. Enforcement of existing environmental laws is more important than enacting new environmental laws.
5. Food aid to developing countries should be tied to reform of land ownership in those countries.
6. Development aid should be given only when the development will benefit the poor and women.
7. Much more land should be set aside for wilderness areas with no public access.
8. The next century is likely to be a better time to live than the present.

How to Spend $5 Million

Divide the class into small groups and give each group the following assignment: "Your task as the budget committee of this state is to allocate $5 million left over after essential services have been budgeted. Use the $5 million to fund all or some of the items below. Indicate how much money you will spend on items you choose.

- reduce tuition at state colleges
- hire more environmental protection enforcement agents
- establish a jobs program for disadvantaged youth
- expand the state's soil conservation program
- improve the public transportation system
- expand the state police force
- improve the sewage treatment plant in the state's largest city
- establish an arts and sciences program for gifted students
- set aside a large parcel of land for a wildlife refuge."

After 15 minutes, ask a representative of each group to report on their spending plan. Discuss why groups chose as they did, and what difficulties they had coming to consensus. Point out to the class that their difficulties reflect in part the difficulties real legislators face.

Citizen Action

Because taking appropriate action is one of the rights and responsibilities of citizenship, it is a good idea to conclude with a problem-solving activity.

Ask your students, as individuals or small groups, to research the problem of toxic waste in the U.S. The discovery of dioxin in Times Beach,

(continued on page four)

Local Efforts in the Third World

by Barbara Wyckoff

In many ways developing countries will be the hardest hit in coming years. Present problems of diminishing natural energy resources, unemployment and poverty will only be exacerbated by continued population growth and an increased dependence on expensive imported fuels. In an effort to alleviate the situation, many countries are taking action. Projects include the introduction of biogas and solar energy, new agricultural techniques, family planning programs and innovative applications of appropriate technology. For example, in the crowded Asian city of Singapore, pigs are raised in a seven-story building, and their waste is used as fertilizer in community gardens or converted into usable energy.

Another example is the effort to conserve fuelwood through the introduction of cookstoves. The fuelwood shortage—and resulting deforestation—has led some countries to encourage the replacement of open fires with cookstoves (see figure). These stoves make is possible to heat three pots with the energy generated from only one fire, resulting in a 40 percent reduction in firewood use. Many of these stoves are made from local supplies of clay and sand, costing nothing to build. Local villagers are trained in their construction and are able to build a productive business.

There are many other examples of Third World people taking action to meet the challenge of increasing demand for limited natural resources. As an activity, students can research other self-help projects or design their own in response to a local problem. The following organizations are good sources of information:

Volunteers in Technical Assistance
1815 North Lynn St., Suite 220
Arlington, VA 22209
(Publishes the *VITA NEWS* newsletter and books on appropriate technology projects.)

Oxfam America
302 Columbus Ave.
Boston, MA 02116
(Publishes reports on a variety of programs and countries which are available upon request.)

Barbara Wyckoff spent two years in Upper Volta with the Peace Corps, teaching English, building cookstoves and establishing cooperatives.

Resources for Teachers

The items below are resources—teaching kits, modules, and activity booklets—for teachers. Where appropriate the address of the organization which published the items is given and readers are encouraged to request a complete publications list. See also the bibliography on page 13 of *The Environment to Come* for additional readings and resources.

• *Environmental Education Activities Manual* by William B. Stapp and Dorothy A. Cox (Wm. Stapp/Dorothy Cox, 32493 Shady Ridge Drive, Farmington Hills, Michigan 48108), 197[illegible], 764 pp. Write for price information.

• ERIC/Clearinghouse for Science, Mathematics and Environmental Education
The Ohio State University
1200 Chambers Road, 3rd Floor
Columbus, Ohio 43212

Environmental Education Teaching Activities for Global Education by William B. Stapp, Lori D. Mann, et al. To be published in late Spring 1983. Write for price information.

"Instructional Materials in Natural Resources," *Information Bulletin* No. 1, 1982, 8 pp. $1.

• Global Perspectives in Education
218 E. 18th Street
New York, New York 10003

"Energy Education," *Intercom* 98, 1980, 40 pp., $2.50

"Food For All: Teaching Against Hunger," *Intercom* 102, 1982, 40 pp. $4.00.

Citizen Action

(continued from page three)

Missouri has generated a number of newspaper and newsmagazine articles on the problems inherent in disposing of chemical and radioactive wastes.**

When students have researched and defined the specific problems, ask them to develop a list of five actions an adult citizen could take to deal with those problems. Have each student or student group share some of their proposed actions with the class. Students can be encouraged to act upon the most effective ideas as out-of-class projects.

**See "Cleaner Air and Water: Can We Afford 690 Billion Dollars?" *U.S. News & World Report*, February 28, 1983, pp. 27-32.

• League of Women Voters
1730 M Street, NW
Washington, D.C. 20036

"Are Jobs Really the Price of a Clean Environment?" *Current Focus*, 1977, 6 pp., $.40.

"Blueprint for Clean Air," *Current Focus*, 1981, 8 pp., $.75.

"The Dollars and Sense of Environmental Protection," *Current Focus*, 1980, 6 pp., $.50.

"Tell It to Washington," 1981, 4 pp., $1.00.

• Population Reference Bureau, Inc.
1337 Connecticut Avenue, NW
Washington, D.C. 20036

Food for Thought: A Population Simulation Kit, revised 1980, $4.00.

Immigration: Questions and Answers teaching module, 1982, 13 pp., $1.

World Population: Toward the Next Century teaching module, 1981, 18 pp., $1.00.

• Zero Population Growth, Inc.
1346 Connecticut Avenue, NW
Washington, D.C. 20036

Elementary Population Activities Kit, 1980, 20 activity units, $15.00.

Global 2000 Countdown Kit, 1982, 14 modules with teacher's guide, $15.00.

EARTHWATCH

The Population Reference Bureau is pleased to provide *Interchange* subscribers with a complimentary copy of the latest issue of *Earthwatch*, the environmental newsletter from the International Planned Parenthood Federation. This issue reports the findings of a new study by the Food and Agriculture Organization of the United Nations on land resources and population, entitled "Land Resources for Populations of the Future." The study discovered that "At subsistence levels of farming, the entire cultivable lands of the developing world—three or four times the present cultivated area—would barely be able to support the expected population for the year 2000."

Additional copies of *Earthwatch* #13 are available from the Population Reference Bureau in classroom sets of 20 copies for $3. A single copy may be purchased for a $1 shipping/handling fee.

PRB Materials and Memberships

Are you interested in rounding out your INTERCHANGE collection? Back issues of INTERCHANGE and the TEACHING TOOL are available for $1.00 each, unless otherwise indicated. Two or more copies are 75¢ each. Titles include:

- "How America Studies Itself: The U.S. Census," February 1980
- "Population and Hawaii: A Case Study," November 1980
- "U.S. Population Data Teaching Package," March 1981 (single copy, $2.00; 2 or more, $1.75 each)
- "Growing Old in America," September 1981 (single copy, $2.00; 2 or more, $1.75 each)
- "World Population: Toward the Next Century," November 1981
- "Population Education: An Audio-visual Approach," December 1981
- "Children: A Constant Concern" with the 1982 World's Children Data Sheet, April 1982
- "Immigration: Questions and Answers," July 1982
- "Teacher's Guide to the Future," December 1982

If you find INTERCHANGE interesting and useful, you would probably enjoy receiving other Population Reference Bureau publications: INTERCOM, the bi-monthly population news magazine; POPULATION BULLETIN, a quarterly in-depth study of one population topic; WORLD POPULATION DATA SHEET, an indispensable survey of 13 variables on 170 nations.

PRB Educator Members receive all the above publications, 17 pieces a year, for a fraction of the regular membership fee. Elementary and secondary teachers pay $10 a year; college teachers pay $15; all students pay $5. The regular individual membership is $25. Educators outside the U.S., add 30 percent to your membership fee.

To join, simply send your name, address (and school affiliation if different from address), and check to: Population Reference Bureau, P.O. Box 35012, Washington, D.C. 20013.

Interchange is . . .

a publication of the Population Reference Bureau, published quarterly during the academic year. This issue was written by Elaine M. Murphy and Patricia Cancellier. Educators may receive a one-year free subscription to Interchange upon request. The purpose of the newsletter is to further the goal of infusing population materials into U.S. schools by: (1) presenting information on population-related issues; (2) distributing classroom materials; (3) reviewing developments in the field of population education. Interchange depends upon an exchange of information and ideas and thus openly solicits correspondence from its readers.

The Population Reference Bureau, Inc., 1337 Connecticut Ave., N.W., Washington, D.C. 20036, is a nonprofit education organization established in 1929. The Bureau is a source of information on the facts and implications of national and world population trends.

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Population Reference Bureau, Inc.

Population Education Newsletter

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March 1984

Population Education: Tools for Teachers

1984 marks the 10th anniversary of an historic event: the first United Nations World Population Conference, held in Bucharest, Rumania. It is also the occasion of the second World Population Conference, to be held in Mexico City in August. There the governments of almost all nations of the world will gather to assess what progress has been made during the past decade in meeting the challenges posed by rapid population growth and other demographic changes. Delegates will discuss how well the recommendations made in 1974 have been implemented, what lessons have been learned, and what course corrections must be made.

One of the recommendations made in 1974 concerned the role that teachers could play. There was unanimous agreement that students everywhere should learn about the causes and consequences of population change and the meaning of those changes for themselves and their families, their communities and nations, and the world.

Ten years ago, a person assembling a resource list for teaching about population would be able to find materials but it would be a relatively thin collection. Today, we are happy to say, the problem is choosing among the many written and audiovisual resources for educators. This list constitutes a small selection of these resources—our recommendations based on "useability" and variety. It updates PRB's annotated bibliography, **Population Education: Sources and Resources,** published in 1979.

Background Reading

OUR POPULATION PREDICAMENT: A NEW LOOK (1979) by Jean van der Tak, Carl Haub and Elaine M. Murphy. *Population Bulletin,* Vol. 34, No. 5. Population Reference Bureau, 2213 M St. N.W., Washington, D.C. 20037. $4.00; 2-10 copies, $3.00 each; 11-50 copies, $2.50 each. Add $1.00 for shipping/handling on all orders under $20.00.

A 48-page reading which traces the history of human population growth from prehistoric times to the present. Included is a clear discussion of Europe's "Demographic Transition" from high to low fertility and whether we might expect developing countries to follow the same path in the future. Contains excellent charts, tables and graphs which are available as slides (19 slides for $9.50).

POPULATION: DEMOGRAPHY AND POLICY (1981) by Robert Weller and Leon F. Bouvier. St. Martins Press, Inc., P.O. Box 36, Lavallette, N.J. 08735. 380 pp. $15.95

An introductory textbook for high school or college-level students. Its coverage of population behavior ranges from the impact of the individual "population actor" to the effects of direct and indirect government policies on national and global population trends. An instructor's manual accompanies the text. Clear and well-written.

POPULATION EDUCATION: A KNOWLEDGE BASE (1979) by Willard J. Jacobson. Teachers College Press, 1234 Amsterdam Ave., New York, N.Y. 10027. 228 pp. $12.95.

A text designed to give middle and junior high school teachers a knowledge base about the many facets of population. Includes exercises and discussions to stimulate student interest. An excellent reference work.

WORLD POPULATION: THE PRESENT AND FUTURE CRISIS (1980) by Phyllis Piotrow. HEADLINE Series, Foreign Policy Association, 205 Lexington Ave., New York, N.Y. 10016. $2.00; 10-99 copies, 25% off. Add $.70 for shipping/handling.

An 80-page booklet which reviews the world population situation and possible future consequences. It describes the unprecedented world population growth occurring in the 20th century, most of it in developing countries. Excellent visuals and discussion questions.

BUILDING A SUSTAINABLE SOCIETY (1981) by Lester R. Brown. W.W. Norton & Co., 500 Fifth Ave., New York, N.Y. 10017. 433 pp. $14.95.

An analysis of the stresses rapid population growth and affluence place on natural resources, ecological systems and agriculture as well as on economic and social systems.

"IMMIGRATION: HOW IT'S AFFECTING US" by James Fallows. *The Atlantic Monthly,* November 1983, pp. 45-106.

An excellent article about a topic which perhaps best illustrates how the U.S. is connected to and affected by the rest of the world.

Note: for brief overviews of population topics, see **World Population: Toward**

the Next Century; Food and Population: A Global Concern; Immigration: Questions and Answers; and **The Environment to Come: A Global Summary** in the next section.

Materials For Teachers, Students Or Both

POPULATION EDUCATION ACTIVITIES FOR THE CLASSROOM (1977) edited by Judith M. Schultz and Herbert L. Coon. ERIC, The Ohio State University, 1200 Chambers Rd., Columbus, Oh. 43212. $4.00.

A useful collection of over 100 population education activities for all grade levels. Exercises range from an opinion poll on population to an analysis of songs for population content to a simulation on average family size.

POPULATION EDUCATION RESOURCES KIT. Zero Population Growth, Inc., 1346 Connecticut Ave. N.W., Washington, D.C. 20036. A revised edition will be available in Spring 1984. $15.00.

A kit for intermediate and secondary teachers: a collection of exercises, a quiz, classroom activities, bibliography and samples of population materials. This kit has been distributed to over 4000 educators.

ELEMENTARY POPULATION ACTIVITIES KIT (1981). Zero Population Growth (address above). $15.00. A free brochure describes the kit.

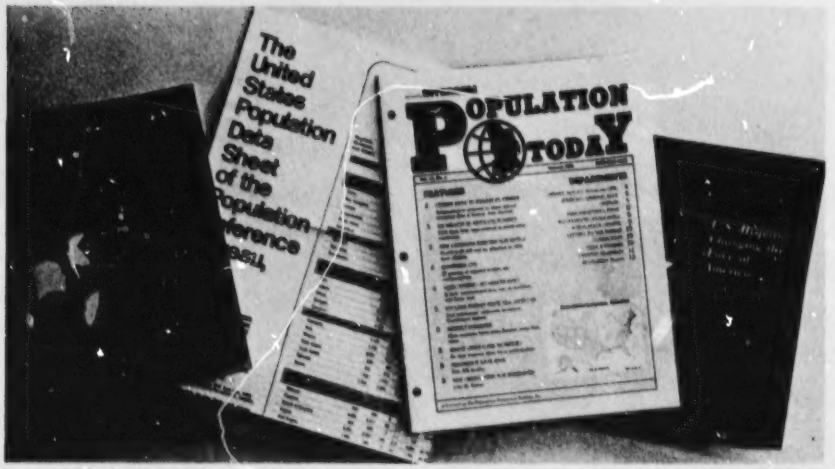
Twenty modules for K-6 classrooms which can be used individually or together as a unit. Each module consists of activities on a specific topic such as exponential growth, carrying capacity, doubling time, and migration. Sample titles of activities: "Poopumonsters," "More Equals Less," and "Crowding Can Be Seedy."

POPULATION ISSUES (1981) by the Educational Resources Center, Teachers College Press, 1234 Amsterdam Ave., New York, N.Y. 10027. 267 pp. $12.95.

Part of the Social Sciences Skills: Activities for the Secondary Classroom series. A self-contained module consisting of student materials—readings, charts and graphs, fact sheets, work sheets, and self-tests on knowledge and attitudes—all on duplicating masters plus detailed lesson plans. Topics include world and U.S. population, rural-urban migration, American immigration, and population data-gathering.

POPULATION PROFILES. Center for Information on America, Washington, Conn. 06793. Write for prices and a list of future topics.

The second series of inexpensive booklets (usually about eight pages) for high school social studies classes. **"Why Study Population?," "China,"** and **"The Population of the Middle East"** are the first of the new series.



POPULATION, VOLUME 3 (1982). Social Issues Resources Series (SIRS), P.O. Box 2507, Boca Raton, Fla. 33432. $26.00.

Volume 3 of the Population series consists of 40 articles drawn from magazines, journals, newspapers, chapters of books and other sources. They cover the major population issues and events of the early 1980s, including the 1980 Census, and represent a wide range of viewpoints. The collection is usefully packaged in a loose-leaf binder and comes with a study guide for the teacher.

TEACHING ABOUT POPULATION ISSUES (revised 1983) by George C. Otero, Jr. Center for Teaching International Relations, CTIR Publications, University of Denver, Denver, Col. 80208. $12.95. Add $2.00 for shipping/Handling on one book; $.25 for each additional book.

A 129-page book of lesson plans and student handouts, appropriate for grades 6-12, which helps students to examine the issues and clarify their views on the kind of personal and global environment they desire.

TEACHING ABOUT POPULATION GROWTH (revised 1983) by George C. Otero, Jr. Center for Teaching International Relations (address above). 169 pp. $12.95. Add $2.00 for shipping/handling on one book; $.25 for each additional book.

A set of lesson plans and student handouts which examine population growth and the related phenomena of population density and distribution. The activities are intended for grades 6-12.

TEACHING MATERIALS FROM THE POPULATION REFERENCE BUREAU, 2213 M St. N.W., Washington, D.C. 20037.

PRB's Education Department produces inexpensive, easy-to-use, up-to-date and objective materials on population for the classroom. Grade levels are high school through undergraduate; although some advanced junior high students can deal with the materials successfully. Among them are student modules, 13- to 17-page self-contained units with a reading, graphs, tables, photographs, discussion questions, activities, bibliography, and ideas for research or debates. Each is accompanied by an issue of **Interchange** newsletter containing a teacher's guide. $2.00 each; two or more copies, $1.75 each.

- **World Population: Toward the Next Century.** Includes a reprint of the **World Population Data Sheet** and activities based on it. (1981)
- **Immigration: Questions and Answers.** Deals with our international roots, recent changes in immigration patterns and the hotly debated immigration reform bills before Congress. (1982).
- **The Environment to Come: A Global Summary.** Summarizes six recent global studies of the future of world population, resources, and environment. (1983)
- **Food and Population: A Global Concern.** Clarifies the complex interrelationships among food production, poverty and rapid population growth. (1984)

Three issues of **Interchange** newsletter are of special interest: **"The Population of China,"** a 4-page reading based on the recent Chinese census; **"Hispanics in the United States,"** a 6-page reading, tracing the origins and settlement patterns of our fastest growing minority; and **"Children: A Constant Concern,"** a 4-page review of the state of the world's children, accompanied by the **World's Children Data Sheet.** $1.00 each; two or more copies, $.75 each.

Food for Thought: A Population Simulation Kit. Group activities for 25 to 100, background reading and games explore the impact of population change on people, food, and land. Includes maps, charts, graphs, sample scripts and a World Population Data Sheet. $4.00.

PRB Chart Series. Graphs of world population and development trends in wall size (17" x 22") and notebook size 8½" x 11"). Notebook size charts feature essays on the reverse. Wall charts, $2.00 per set of 6 or 8 charts; notebook size charts, $.50 per set. Slides are also available at $.50 each. Send for a list of chart titles.

Also available from the Population Reference Bureau:

- **Population Bulletins:** Concise, lively, paperbound essays (44-52 pages), written by experts on population and population-related topics. Widely used by colleges, universities and libraries. Sets of slides for the graphs and tables appearing in each **Bulletin** are available. In addition to **Our Population Predicament,** recommended in the Background Reading section above, see **Resources, Environment and Population: The Nature of Future Limits, Population Growth and Poverty in the Developing World,** and separate **Bulletins** on demographic trends for each of the following countries: Mexico, Sweden, Kenya, Cuba, India, Eastern Europe, the Soviet Union, China, and Israel. $4.00 each; 2-10 copies, $3.00 each; 11-50, $2.50 each.
- **Population Handbook,** a widely-acclaimed, clear and lively guide to demographic basics (birth, death, and migration rates, age-sex structure, population growth and more) plus sources of population information. Available in the original edition (in English, with U.S. and developing country examples, 1982 update), International English edition (international examples, 1982 update), Spanish, French or Arabic editions. $4.00.
- **The World Population Data Sheet.** Annual wall chart in its 21st year of publication, includes 14 columns of data for 171 countries, geographic regions, more and less developed countries as a whole, and the world; contains population estimates; projections for 2000 and 2020; population doubling times; fertility, mortality, and natural increase rates; life expectancy; urban, child and elderly population; per capita GNP; and per capita calorie supply. $2.00 each; 2-49 copies, $1.75 each.
- For those interested in the U.S. population, see also the **U.S. Population Data Teaching Kit,** which contains four ditto masters with student activities, one U.S. Population Data Sheet and a teaching guide, $2.00 (2 or more copies, $1.75 each); **Growing Old in America,** a kit of student readings, activities, and resources on the growing population of the elderly in the U.S., $2.00 (two or more, $1.75 each); and the **U.S. Demographics Package** consisting of a U.S. Population Data Sheet and three *Bulletins* **(U.S. Population: Where We Are; Where We're Going, Black America in the 1980s,** and **U.S. Hispanics: Changing the Face of America),** $12.00 (the parts can be ordered separately: the **U.S. Population Data Sheet** at $2.00; 2-49 copies, $1.75 each; the **Bulletins** at $4.00; 2-10 copies, $3.00 each; 11-50 copies, $2.50 each).

POPULATION IN THE GLOBAL ARENA: ACTORS, VALUES, POLICIES AND FUTURES (1982) by Parker G. Marden, Dennis G. Hodgson and Terry L. McCoy. CBS College Publishing, 383 Madison Ave., New York, N.Y. 10017. 169 pp. $8.95.

This paperback is part of the Global Issues Series and is a thoughtful, well-balanced presentation of all the population components mentioned in its title. Each chapter consists of readings on various aspects of population, each of which is followed by specific exercises to reinforce the concept, clarify values, or encourage student problem-solving. Includes an annotated bibliography. Appropriate for advanced high school and college students.

PEOPLE: AN ENDANGERED SPECIES? (1983 update) by Cynthia Green. National Wildlife Federation, 1412 Sixteenth St. N.W., Washington, D.C. 20036. 15 pp. Free.

What do present population and future population levels mean to the human race and its environment? This booklet describes the problems and reasons to limit growth and thus divert humankind from a path of self-destruction.

Bibliography

THE NEW AMERICANS (1983) by Brent Ashabranner. Dodd, Mead & Co., 79 Madison Ave., New York, N.Y. 10016. 212 pp. $13.95.

Beautifully written, with excellent photographs, this book describes the change in national origins of the latest wave of U.S. immigrants and the significance of these trends. An in-depth look at today's immigrants—legal and illegal—and refugees. It tells their stories, often in their own words, and shows their hopes, problems, and contributions. High school and college level.

"POPULATION AND ENVIRONMENT." (1983) Edited by John Rowley. PEOPLE, Vol. 10, No. 1. International Planned Parenthood Federation, 18-20 Lower Regent St., London SW1 Y4PW, England.

An entire issue of **People** (IPPF's population and development journal) devoted to the interactions between population and the environment especially in developing countries. Comes with a large multi-color poster on the same topic. High school level and above.

LIVING IN THE ENVIRONMENT (1982 edition) by G. Tyler Miller, Jr. Wadsworth Publishing Co., 10 Davis Dr., Belmont, Cal. 94002. 500 pp. $27.95.

A dynamic text on the environment, dealing with population, land use, and ecology, with recommendations for problemsolving. Includes reprints of "outside readings" in the text. Although intended for undergraduates, high school students would also find it very interesting.

POPULATION: THE DYNAMICS OF DEMOGRAPHIC CHANGE (1983 edition) by Charles B. Nam and Susan Gustavus Philliber. Prentice-Hall, Englewood Cliffs, N.J. $21.95.

An introductory college text suitable for use in upper high school classes. Contains good graphics, clear explanations, and challenges to students' problemsolving ingenuity.

THE GLOBAL 2000 REPORT TO THE PRESIDENT: ENTERING THE TWENTY-FIRST CENTURY (1981). The Summary Report. U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-011-00037-8. 50 pp. $3.50.

The findings of a 3-year government study which projects worldwide population, natural resources, and environmental trends. The report stresses that the conditions it describes can be averted if nations recognize the problems and develop policies to address them. *Global Future: Time to Act* (1981) is the 209-page report of a task force which made recommendations in response to the forecasts of *The Global 2000 Report*. $7.00.

NO ROOM FOR MAN (1979) edited by Ralph Clem, Martin Greenberg and Joseph Olander. Littlefield, Adams & Co., 81 Adams Dr., Totowa, N.J. 07512. $4.50.

A paperback which permits high school and college students to explore population and the future through science fiction and to consider how to avoid grim scenarios, such as the story in which population density is so high that. . . .

PEOPLE (1981) by Peter Spier. Doubleday & Co., 245 Park Ave., Garden City, N.Y. 10167. $10.00.

A delightful picturebook for elementary school children by the award-winning author and illustrator. It emphasizes the unique qualities of each of the over four billion individuals on earth. A wonderful way to begin global education.

STATE OF THE WORLD 1984 (1984) by Lester R. Brown, *et al.* W.W. Norton & Co., 500 Fifth Ave., New York, N.Y. 10017. 300 pp. $15.95.

A global report card by the author of **Building a Sustainable Society:** how well are we doing to slow population growth, conserve our resources, and preserve our agricultural base, among other challenges?

WORLD DEVELOPMENT REPORT 1984 (to be published mid-1984). The World Bank, Publications Office, 1818 H St. N.W., Washington, D.C. 20433. $8.00.

The World Bank's annual report on development trends in the world; the 1984 report is entirely devoted to population and will be issued just prior to the World Population Conference in August 1984. It will be, no doubt, an excellent resource.

WORLDWATCH PAPERS. Paperbound booklets on global topics by Lester Brown and his colleagues at the Worldwatch Institute. Order through the Population Reference Bureau, Box 35012, Washington, D.C. 20013. $2.00 each; 2-10 copies, $1.50 each; 11-50 copies, $1.25.

Of special interest for population studies, see:

- #5 **Twenty-two Dimensions of the Population Problem**
- #8 **World Population Trends: Signs of Hope, Signs of Stress**
- #14 **Redefining National Security**
- #16 **Women and Population Growth: Choice Beyond Childbearing**
- #29 **Resource Trends and Population Policy: A Time for Reassessment**
- #33 **International Migration: The Search for Work**
- #38 **City Limits: Emerging Constraints on Urban Growth**
- #41 **Men and Family Planning**
- #43 **Refugees: The New International Politics of Displacement**
- #47 **Infant Mortality and the Health of Societies**
- #48 **Six Steps to a Sustainable Society**
- #53 **Population Policies for a New Economic Era**
- #54 **Promoting Population Stabilization: Incentives for Small Families**

Appropriate for high school and college students.

THE POVERTY OF NATIONS: THE POLITICAL ECONOMY OF HUNGER AND POPULATION (1980) by William W. Murdoch. The Johns Hopkins University Press, Charles & 34th Streets, Baltimore, Md. 21218. $7.50.

Addresses the problems of rapid population growth, starvation, and rural poverty as intimately related concerns with common roots in social and economic inequality of Third World societies. College level.

THE COMING BOOM: ECONOMIC, POLITICAL AND SOCIAL (1982) by Herman Kahn. Simon & Schuster, 1230 Ave. of the Americas, New York, N.Y. 10020. $14.95.

An optimistic view of the future for the U.S. and the world including an end to population growth and more plentiful resources as the U.S. and worldwide economies improve. This book is a sounder example of a viewpoint divergent from most experts in the population and resource field than is Julian Simon's **The Ultimate Resource,** which received widespread attention but much criticism for its emotional and unscientific tone.

THE CORNUCOPIAN FALLACIES (1982) by Lindsey Grant. The Environmental Fund, 1302 18th St. N.W., Washington, D.C. 20036. $3.00. Add $.65 for postage and handling.

A 34-page booklet which analyzes and counters the "Cornucopian" viewpoint, which says that our problems will be solved through technology and our future will be one of abundance.

Oldies But Goodies:

a. **AN ESSAY ON THE PRINCIPLE OF POPULATION (1798) by Thomas Malthus (plus other essays). W.W. Norton & Co., 500 Fifth Ave., New York, N.Y. 10017. $5.95.** By the 19th century cleric who may have "started it all."

b. **THE POPULATION BOMB (1968) by Paul Ehrlich. Ballantine Books, 201 E. 50th St., New York, N.Y. 10022. $2.50.** The book that may have "started it all" in the U.S.

c. **POPULATION: DYNAMICS, ETHICS AND POLICY (1975). American Association for the Advancement of Science, 1776 Massachusetts Ave. N.W., Washington, D.C. 20036. $4.50.** A collection of classic articles on population, published over the preceding 10 years in **Science Magazine.**

d. **HUMAN POPULATION: A SCIENTIFIC AMERICAN BOOK (1974). W.H. Freeman & Co., 660 Market St., San Francisco, Cal. 94104. $3.75.** More classic articles by experts in the field which appeared in the September 1974 issue of **Scientific American.**

"THE STATE OF THE WORLD POPULATION 1983" (1983) by Rafael Salas. United Nations Fund for Population Activities, Publications Office, 220 E. 42nd St., New York, N.Y. 10017. Free.

A booklet describing current and possible future population levels in various parts of the world. Ask about publications

available for the 1984 International Population Year.

"POPULATION EDUCATION IN THE SCHOOLS" (1982) POPULATION REPORT, Population Information Program, Johns Hopkins University, 624 North Broadway, Baltimore, Md. 21205. Single copies free; multiple copies $.50 each in the U.S., free in any quantity to developing countries.

A 43-page report on population education programs around the world and how they've dealt with curriculum planning, teacher training, materials, and evaluation. Includes case studies and an excellent bibliography.

ANNOTATED BIBLIOGRAPHY ON POPULATION, RESOURCES AND ENVIRONMENT RELATIONSHIPS (1982) by Seth Hollander. EPAD Report #19, Environmental Policy Analysis Dept., National Audubon Society, 950 Third Ave., New York, N.Y. 10022. $5.00.

A useful description of books and articles including a section on policies to solve the problems. Addresses and prices are given, too.

NEW INTERNATIONAL ENCYCLOPEDIA OF POPULATION. (1982) by John A. Ross. The Free Press, 866 Third Ave., New York, N.Y. 10022. $125.00.

If you can't find it anywhere else, it's probably in this two-volume, 750-page compendium of population information.

GREAT EXPECTATIONS: AMERICA AND THE BABY BOOM GENERATION (1980) by Landon Y. Jones. Coward, McCann & Geoghegan, New York. $15.95.

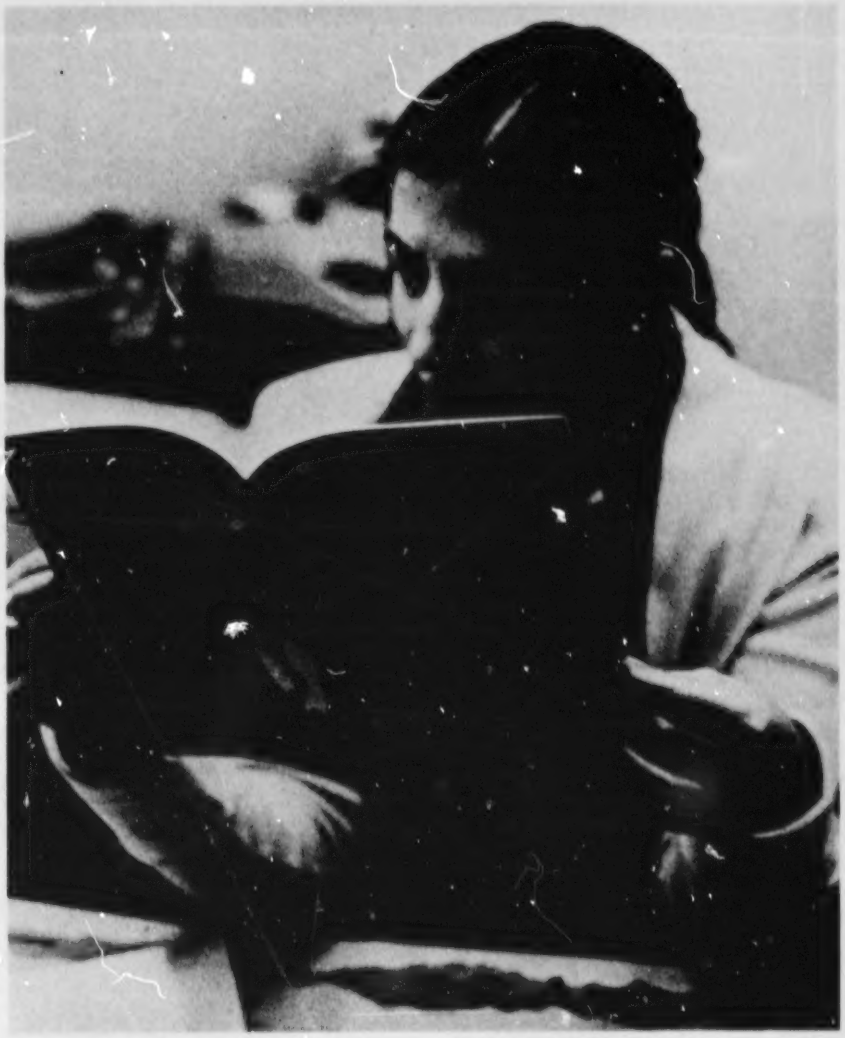
A lively description by a journalist of the famous post-World War II Baby Boom cohort from its birth to what it might expect in its elderly years. Some chapter titles: "The Vietnam Generation," "The Road to Woodstock," and "Children of the Media."

Organizations/Resource Guides

There are many organizations that can supply low- or no-cost materials, information, and sometimes services such as teachers' workshops or class speakers. Write to the following for their publications lists:

Population Reference Bureau, Inc.
2213 M St. N.W.
Washington, D.C. 20037

Worldwatch Institute
1776 Massachusetts Ave. N.W.
Washington, D.C. 20036



The World Bank
Publications Office
1818 H St. N.W.
Washington, D.C. 20433

The Environmental Fund
1302 18th St. N.W.
Washington, D.C. 20036

ERIC Clearinghouse for Social Studies/Social Science Education
855 Broadway
Boulder, Col. 80302

ERIC/SMEAC Center for Science, Mathematics and Environmental Education
1200 Chambers Rd.
Columbus, Oh. 43212

National Council for Geographic Education
University of Houston
Houston, Tx. 77004

Population Action Council ("Educators Who Care")
110 Maryland Ave. N.E.
Washington, D.C. 20002

Zero Population Growth, Inc.
1346 Connecticut Ave. N.W.
Washington, D.C. 20036

Population Crisis Committee
1120 19th St. N.W.
Washington, D.C. 20036

UNIPUB (for United Nations publications)
Box 433
Murray Hill Station
New York, N.Y. 10016

Population Program
National Audubon Society
950 Third Ave.
New York, N.Y. 10022

Population Program
Sierra Club
530 Bush St.
San Francisco, Cal. 94108

College Curriculum Support Project
User Training Branch
Data User Services Division
Bureau of the Census
Washington, D.C. 20233

DIRECTORY OF THE POPULATION-RELATED COMMUNITY OF THE WASHINGTON, D.C. AREA, Population Reference Bureau, P.O. Box 35012, Washington, D.C. 20013. $3.00.

A 106-page guide to resources, information, internships, graduate programs, and organizations. Includes governmental and nongovernmental organizations, UN affiliates, and universities.

POPULATION EDUCATION: SOURCES AND RESOURCES. Population Reference Bureau (address above). $1.00.

The best in readings, teaching units, audiovisual aids, and organizations through May 1979. Complements this list.

Audiovisual Aids

The following 16-mm. films and video cassettes are among many available for rent from the Population Reference Bureau Film Library. The rental fee is $5.00 per film on rentals shown before June 30, 1984 and $10.00 per film on rentals shown after June 30, 1984. Send your orders to: PRB Film Library, 2213 M St. N.W., Washington, D.C. 20037. Purchase information is available upon request. Send for a complete list; include a self-addressed stamped business envelope.

16 mm Films

"Grain of Conscience" (1977), 28 minutes, Junior High to College level. Examines many aspects of the world hunger problem (including the role of population growth) along with potential solutions that may lead us to become better farmers, fishermen, and consumers. Part of the Jacques Cousteau "Oasis in Space" series.

"Mexico in the Year 2000" (1979), 12 minutes, Junior High to College level. Produced in Mexico in cooperation with the national government, this film explains the rapid increase in the country's population since 1900 and projects into the future to suggest the difficulties Mexico will have in providing jobs, food, education, and housing for the population in the year 2000.

"Population Time bomb" (1977), 29 minutes, Junior High to College level. Discusses the problems of overpopulation in the developed and developing worlds, using the opinions of such experts as Carl Sagan, Paul Ehrlich, Margaret Mead, and Buckminster Fuller. Two Latin American countries—Costa Rica and El Salvador—are used as examples. Part of the Jacques Cousteau "Oasis in Space" series.

"Refugee Women" (1980), 30 minutes, High School to College level. Produced by the United Nations High Commissioner for Refugees, this film describes the special problems faced by women refugees. It focuses on three groups of women—Asian women in a refugee camp, Chilean women who have resettled in Sweden, and African women in a Somalian refugee camp. Despite the different locations and conditions, these women have common problems that set them apart from male refugees—poorer nutrition and health, lower levels of education, and fewer legal rights. (The film contains a short childbirth scene in an Asian camp which may make it inappropriate for some audiences.)

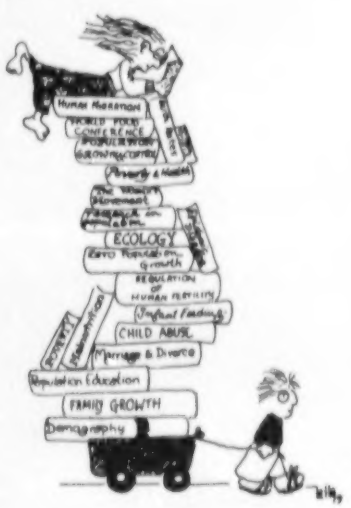
"Sri Lanka: Past, Present and People" (1980), 37 minutes, High School to College level. Produced by the U.N. Fund for Population Activities, this film describes Sri Lanka's history, current population dynamics, and prospects for the future.

"World Population" (1972), 3 minutes, Elementary to College level. A graphic presentation of world population growth and distribution from 1 A.D. to the present, and projected to the year 2000. One of the most popular population films ever.

Video Cassettes (¾")

"A Finite World" (1982), 60 minutes, High School to College level. A documentary exploring the world population situation in seven Asian countries—Singapore, Hong Kong, Indonesia, Thailand, India, Bangladesh and Sri Lanka—and three African countries—Kenya, Egypt and Tunisia. Produced by the Turner Broadcasting System.

"Forgotten Fundamental of the Energy Crisis" (1980), 54 minutes, High School to College level. A fascinating presentation on exponential growth of human populations and energy consumption. The speaker is Dr. Albert A. Bartlett of the University of Colorado who opens the presentation by saying, "the greatest shortcoming of the human race is our inability to understand the exponential function."



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